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Telephony

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SINCE 1901

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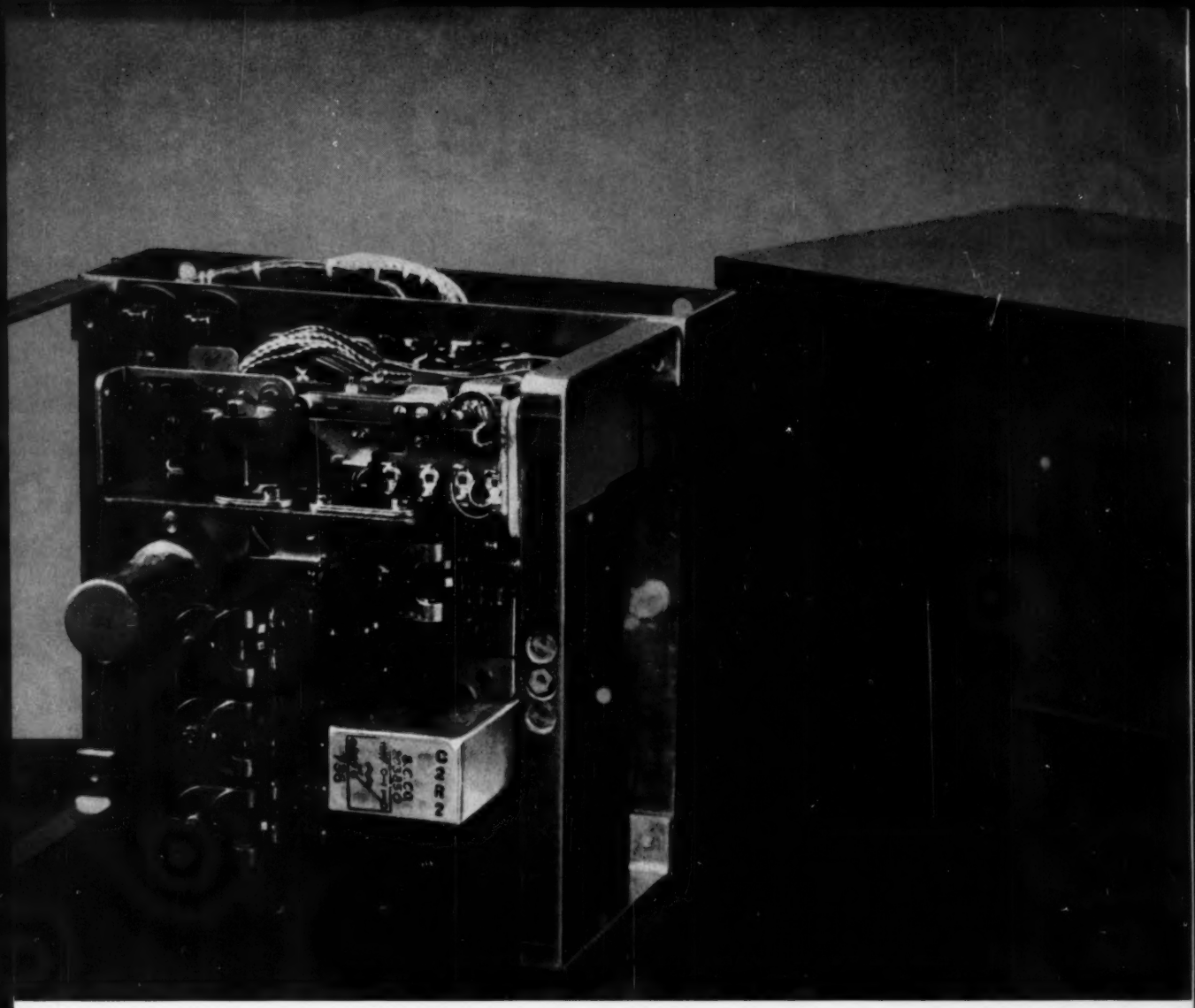

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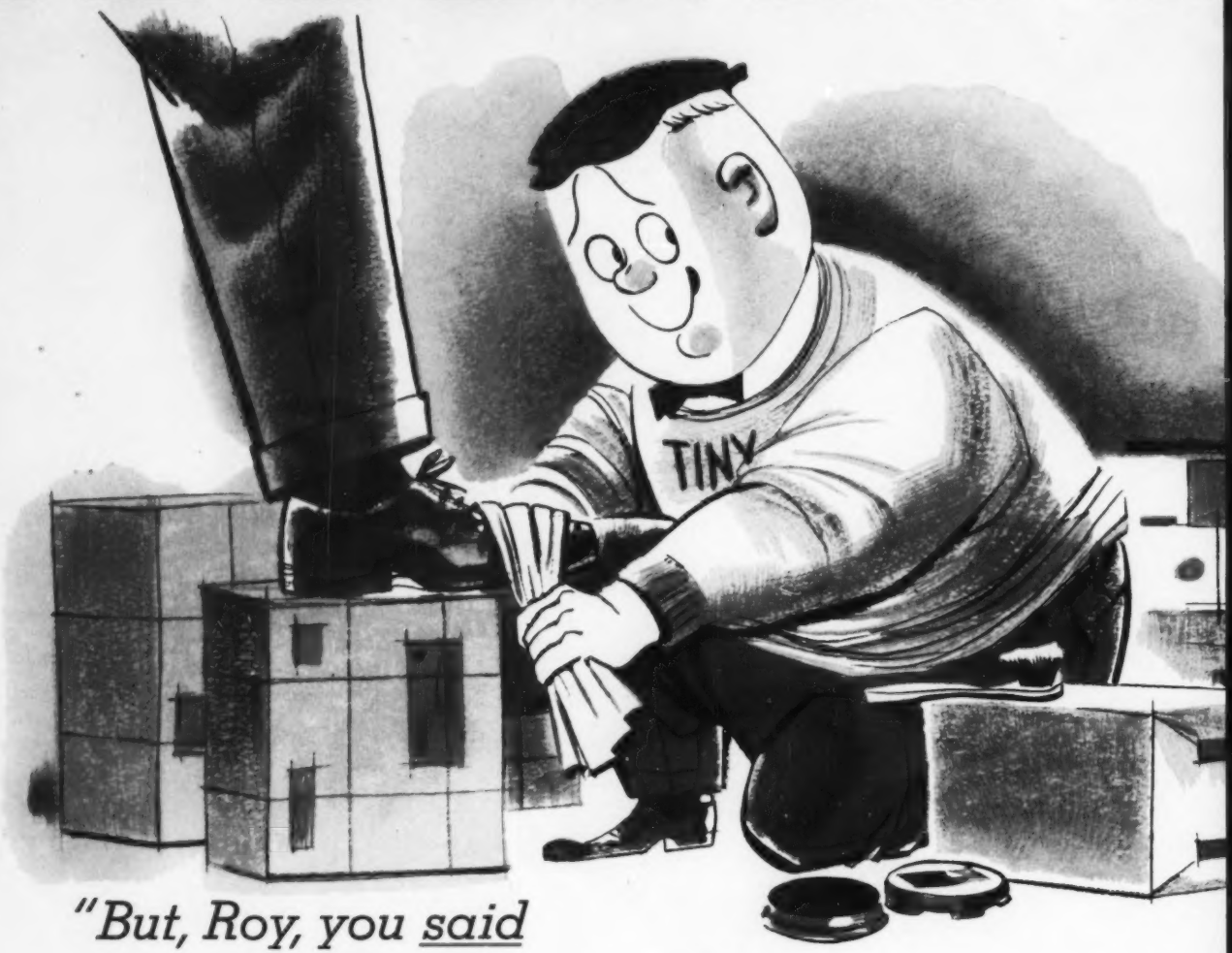

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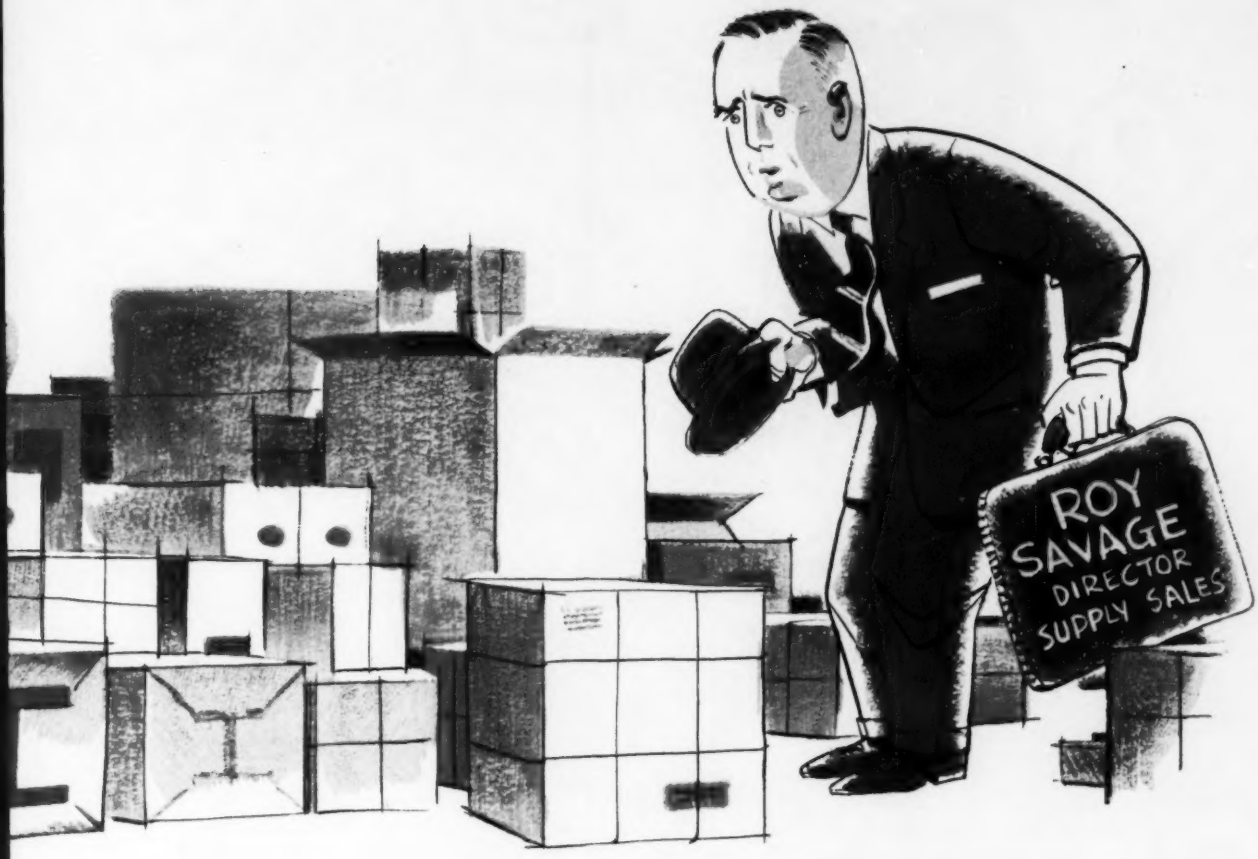

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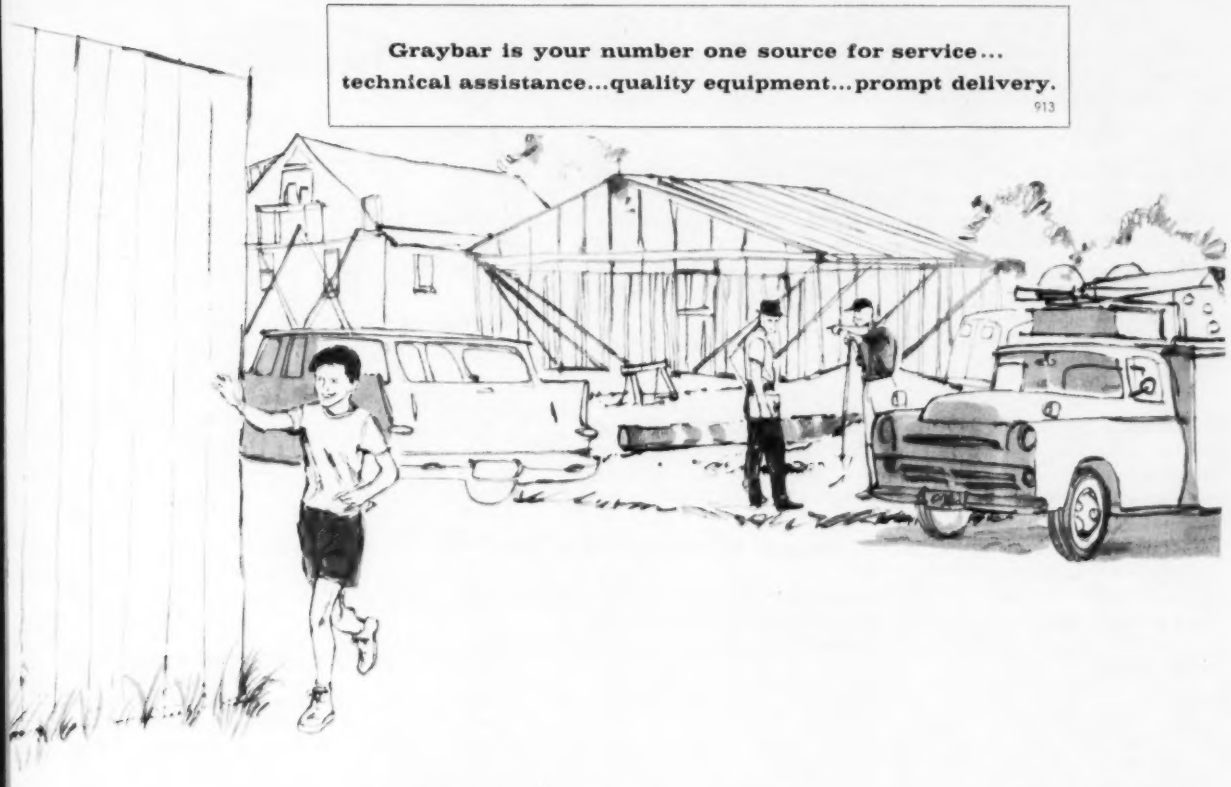

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". . . this can be translated as 'supposing six score saws sever six score cigars. Sixty score saws will sever sixty score cigars.'

"(A reader says) that judging from their tact and voices, French operators employed on trunk calls have been very well schooled. . . ." —The *Manchester Guardian Weekly*.

•

LADIES FIRST. A wife met her business executive husband at the airport and while they were waiting for his baggage a very snazzy-looking airline hostess came along and the husband greeted her warmly, "Hi, Miss Jones."

"How do you know her name?" the wife asked, to which he replied, "It was listed in our plane, right up front, with the names of the pilot and co-pilot."

"I see," said the wife grimly. "Tell me, dear, what was the pilot's name?"

•

PHONEVISION ANYONE? Ned Greenslit, executive director of the Colorado division of the American Cancer Society, has been fooled so often by a friend who likes to give imitations and hold guessing games over the telephone that he's turned into a very skeptical man.

This friend has been the culprit so often that Mr. Greenslit almost doesn't ever believe his ears any more.

Several days ago when Greenslit answered the telephone, he heard a suave show business accent asking what arrangements had been made about emceeing the $100 a plate Colorado Cancer Research dinner.

The person on the line told Ned Greenslit that he was Georgie Jessel. Ned figured he had put up with his kibitzer buddy long enough and told him off without giving the caller a chance to say another word. A few days later Greenslit found out that his caller was George Jessel.

•

SEEING'S NOT BELIEVING. On the outskirts of an Oklahoma town are six service stations in a row.

Posted in front of the first is a large sign: "Last Chance to Buy Gas—the Next Five Stations are Mirages."

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Telephony

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Since 1901

October 3, 1959

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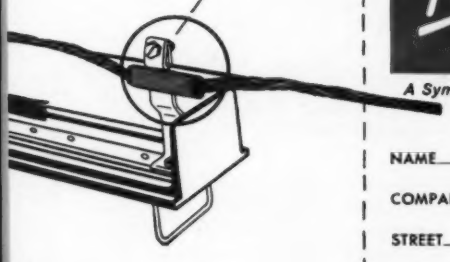

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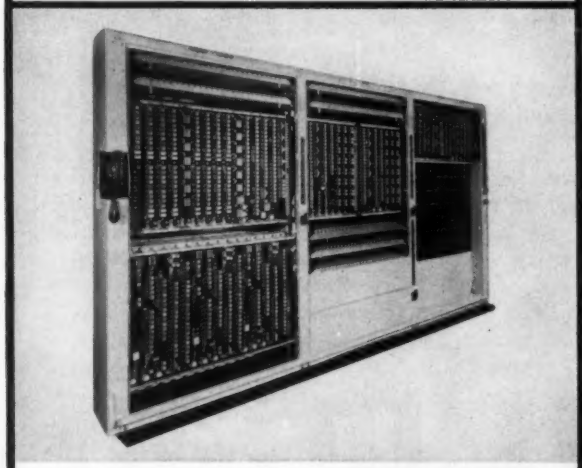

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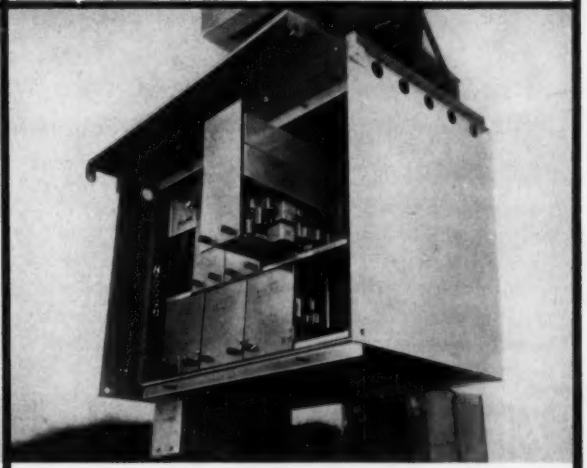

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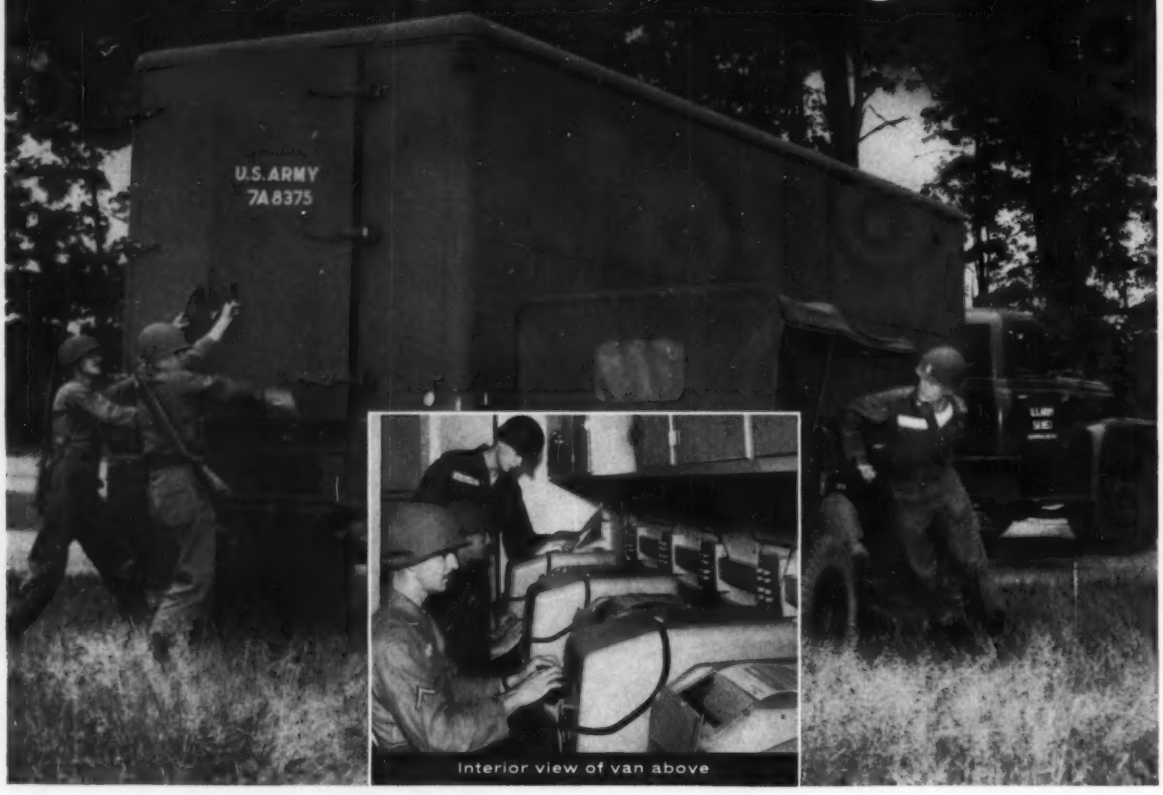

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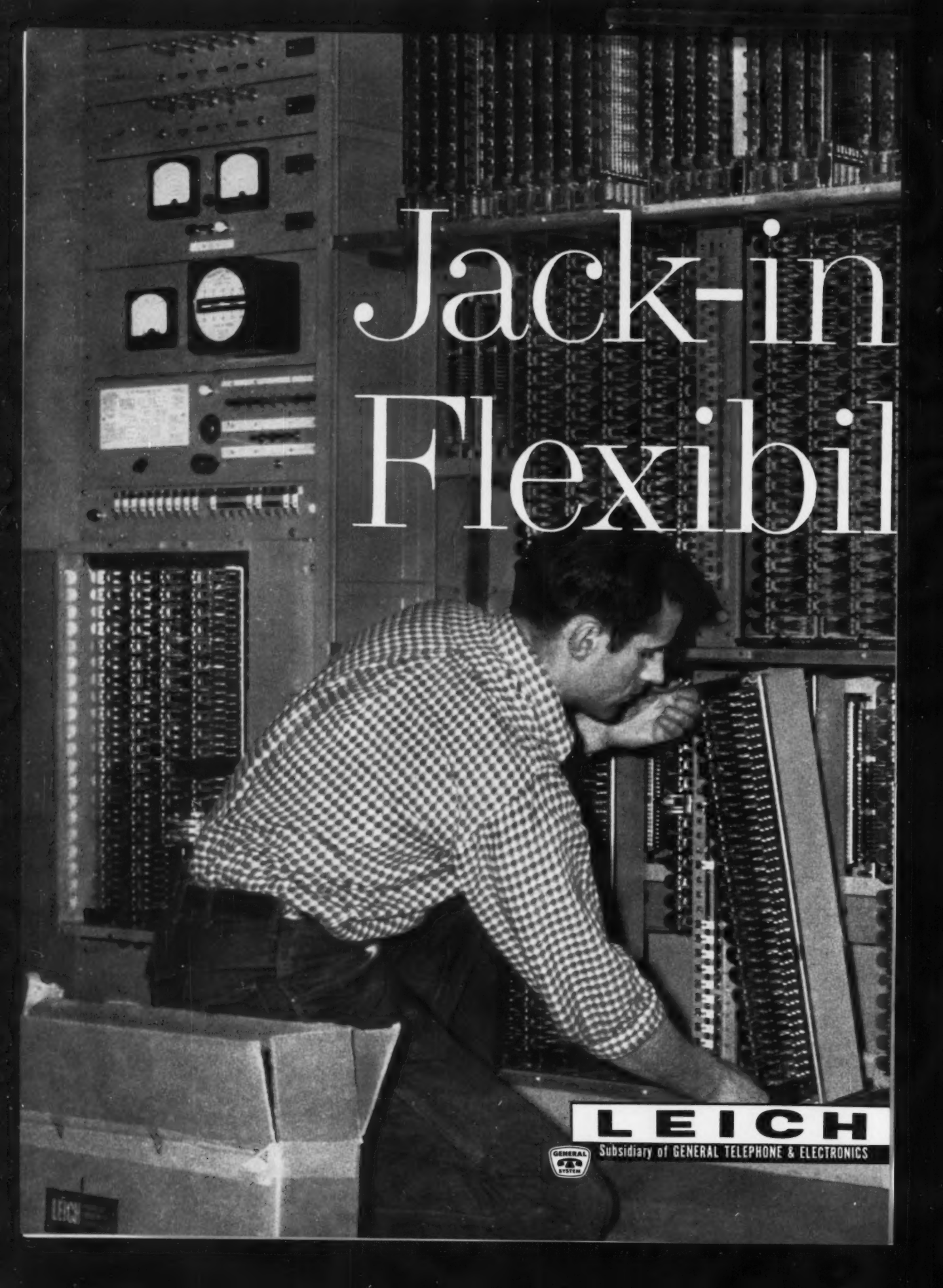
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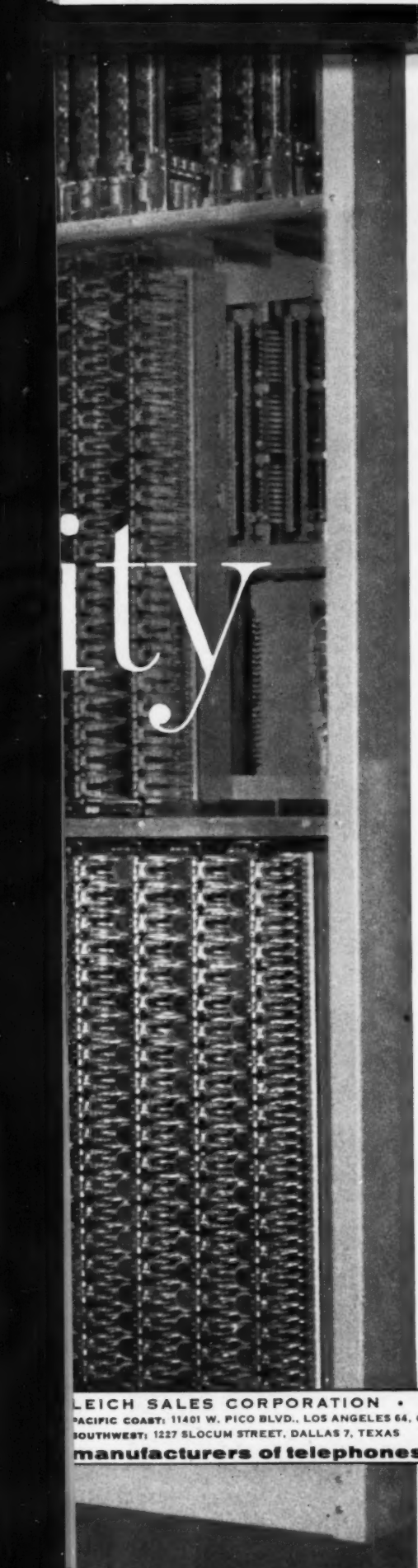

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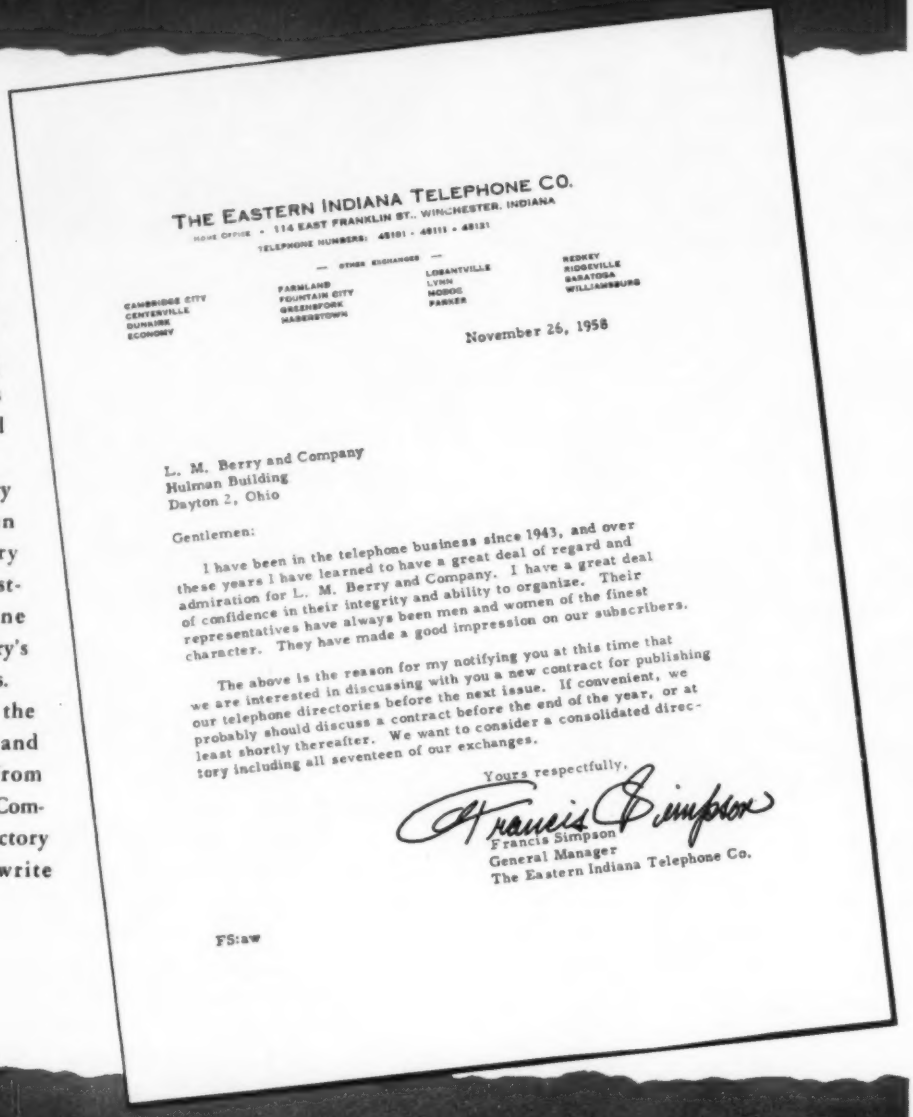

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The above is the reason for my notifying you at this time that we are interested in discussing with you a new contract for publishing our telephone directories before the next issue. If convenient, we probably should discuss a contract before the end of the year, or at least shortly thereafter. We want to consider a consolidated directory including all seventeen of our exchanges.

Yours respectfully,

Francis Simpson

Francis Simpson
General Manager
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IN THE NATION'S CAPITAL

BY FRANCIS X. WELCH, WASHINGTON EDITOR
AND EDITOR, PUBLIC UTILITIES FORTNIGHTLY

California firm proposes to establish nationwide private line telegraph system. RCA and NBC accept federal controls in radio-television station acquisitions. FCC microwave ruling under fire by Independents and AT&T.

BELIEVE it or not there is an outfit in California with its eyes wide open, asking for authority to go into the telegraph business in competition with Western Union and, to some extent, with the Bell System and other telephone companies. Considering the unspectacular earnings in the telegraph field over the past two decades, which resulted in an almost merger-by-default between Western Union and the old Postal Telegraph Co., one would think that the last place to look for a bonanza would be in the telegraph business.

But John K. Patterson of El Cerrito, Cal., sole owner of Commercial Communications Co., thinks he can cut rates and make money at the same time if the Federal Communications Commission gives him authority to operate a new nationwide private line telegraph system.

Of course, concentration on just the private line telegraph end of the business is hand picking, to some extent. And it may be that there are business opportunities here which do not appear on the surface. Nevertheless, it is a pretty good bet that the FCC will not bless the launching of such competition, especially after Congress went to such trouble to bless a merger moving in the other direction—the marriage of Postal Telegraph and Western Union—in order to stave off threatened bankruptcy in the old competitive telegraph business.

But, for what it is worth, and saluting Mr. Patterson's fortitude, a consideration of his proposition should be of passing interest to telephone people. Commercial Communications Co., in a word, would offer a teletypewriter network service to business firms and government agencies. It would compete in the communications field with Western Union and American Telephone & Telegraph Co. Patterson told the FCC that he could provide the service at a "low cost comparable with first-class mail." The projected Commercial Communications system, called "Telnet," would link all the major cities.

Patterson told the commission he would rent teletypewriters and a nine-hour dial communications service at rates ranging from $195 to $370 a month. In addition, mileage charges would be tacked on from the telegraph wire link to the nearest relay center. The Commercial Communications application asserted that "today, the mail is too slow for many business transactions and the use of the telephone for transmitting routine business messages wastes needed man power; in addition, most transactions require some form of written document."

The rather limited resources of Commercial Communications (whose assets are quite modest in comparison with the extent of business envisioned) suggest that the FCC would think long and hard before flashing a green light on this application, without a lot more substantial financial backing. But the development should serve to remind all telephone people, even including those in the mighty Bell System, that things do change and nothing stands still forever. Right now the economic security of the telephone business, as such, would seem to be open to no question on the basis of public acceptance and preference. But with vastly different technologies for communication practices bouncing around on the horizon, who knows what challenges the not-too-distant future may bring?

A so-called expert said not long ago that by using a series of artificial satellites as a basis for intercontinental radio relay messages, the cost of a long distance telephone conversation from America to Europe might be in the order of pennies. This might be kissed off as a Sunday supplement-type of speculation, but if there is even a shred of truth in it, even over the long range, who is going to pay for the present investment of billions in conventional cables, outside plant, and other telephone equipment? So a sharp eye to the windward and eternal vigilance is never out of order no matter how safe present-day industrial practices and organization may seem.

RCA-NBC Consent Decree

Radio Corp. of America and the National Broadcasting Co., on Sept. 23, accepted federal controls aimed at preventing the use of network power to acquire new radio-television outlets. The action was taken in an anti-trust consent decree filed in federal court in Philadelphia, ending a Justice Department suit brought against NBC and RCA on Dec. 4, 1956.

In New York, NBC said in a statement that the consent decree carried a network denial of Justice Department charges. It said the decree was entered without admission of any charges and that the merits of the case were not

passed upon. NBC said it acquired the Philadelphia stations in question with the approval of the FCC. It added that it now would "acquire stations in other major markets, thus maintaining the station ownership support needed for the continuation of an effective network service."

In the judgment, the companies agreed to give up ownership of television station WRCV-TV and radio station WRCV-AM in Philadelphia by Dec. 31, 1962. The federal government charged that they were acquired from Westinghouse Corp. under coercion.

But on a much broader scale the court action does three things:

(1) Prevents NBC and RCA from using NBC's "network power of affiliation to acquire any broadcast station by coercion in the future."

(2) Prevents acquisition of any substantial ownership interest in any television station in the large markets without first getting the go-ahead from the Justice Department.

(3) Prevents RCA and NBC from assuming national spot representation for any television outlet which NBC does not now represent without first giving the Department of Justice an opportunity to determine that it does not involve coercive use of network affiliation power.

Microwave Ruling Under Fire

Practically all segments of the commercial communications field have fired away at the FCC's ruling of last August which permits almost indiscriminate licensing of applicants for radio frequencies above 890 megacycles for use in private point-to-point communications. This ruling was reviewed in this department (TELEPHONY, issue of Aug. 22) and it was there stated that the commission's order, if carried out extensively, could create a lot of mischief for the telephone-telegraph companies. Or to put it a little blunter, it could take a lot of bread out of their mouths.

Evidently the principal communication carriers thought so, too, because they all registered protest by way of petition for reconsideration from the following: American Telephone & Telegraph Co., Western Union Telegraph Co., United States Independent Telephone Association (USITA), and General Telephone Service Corp.

USITA and the General System questioned the soundness of the commission's conclusion that there is an abundance of frequencies available for private point-to-point system operation. The two Independent petitioners also argued about the FCC's conclusion that Independent companies follow a policy of permitting interconnection of private systems with telephone company systems. Both General and the USITA stated flatly that such is not a fact and that there is nothing in the record of the microwave case hearings to support any other conclusion than that there is a close similarity between Independent policy and Bell System policy in this respect.

The American Telephone & Telegraph Co., likewise, blasted the FCC's assumption that there are ample frequencies for private point-to-point system operations, especially considering the expanding requirement of space and satellite communications. A lot more is known about this today, said the AT&T, than two years ago when the microwave hearings were closed. All of the common carriers, both telephone and telegraph, urgently requested the FCC to take another long look at its conclusions and consider well what unrestricted lines of point-to-point private systems would lead to.

The FCC's finding that there is nothing in the record to show that telephone companies would be adversely affected by such a ruling was sharply challenged. In short, the FCC was asked to hold up taking any further steps to carry out its order, and to reconsider the whole thing.

The AT&T contended that the commission had a duty to reconsider in view of the fact that the commission has based its conclusions on inadequate or fallacious findings. The Bell petition stated further that "The policy determinations set forth in the present report and order purport to be final in nature and yet, under the procedure in this case, the instant petition is our first opportunity to address ourselves to the commission's own views on these determinations. Here, unlike the ordinary case, there has been no initial or proposed decision — indeed, not even proposed rule making — regarding the policies in question."

There was some argument on the other side, of course. Electronic Industries Association and Motorola, Inc., urged the FCC to deny the telephone-telegraph companies, request for reconsideration. Motorola also asked for more time to file its reply, which was granted by the FCC.

CAB Resignation Starts Argument

Louis J. Hector, a Miami lawyer who has been a member of the Civil Aeronautics Board (CAB) since 1957 stirred up quite a fuss in his recent resignation, accompanied by a 72-page memorandum to President Eisenhower. Hector thinks that the airlines are in danger of being strangled by regulatory red tape. And he thinks that the CAB is doing too much regulating of an industry which could stand on its own managerial feet. The trouble is the remedy which he proposes could lead to far more serious difficulty— for the regulated industries at least— than the shortcomings which he proposes to correct.

Hector did not confine his criticism to CAB, of which he presumably knows something, even though he has been a commissioner for only two years. He also indicts the competency and usefulness of all other major regulatory commissions, including the Federal Power Commission, the Federal Communications Commission, the Interstate Commerce Commission, and the Securities and Exchange Commission — to name but four. Hector's proposal would just about destroy these regulatory boards and leave the regulated industries— interstate gas, electric, telephone, railroad companies, and others — to the mercy of fiat regulation under the thumb of a cabinet department or a ministerial officer subject to a cabinet department. In European countries, where they have had "ministers" of transport, communications, fuel, etc., that stuff has generally been a prelude to eventual nationalization.

So, while we can sympathize with Commissioner Hector in becoming impatient over a federal commission fussing around with such peanut questions as whether airline hostesses should serve liquor, and at what hours and day of the week, or how much of a sandwich constitutes a free meal, there is plenty of trouble locked up in his package of reform. It looks to this writer like a proposal to burn down the regulatory house to get rid of a few bureaucratic mice because of their annoying habits of nibbling away at everything.

Hector feels that if the CAB spent less time regulating minute details of civil aviation it could do some long-range thinking about the industry as a whole. The details, he says, "could better be left to management discretion and the free play of competitive forces."

In the 75-page report to the Presi-

(Please turn to page 41)

Correction in Albert's "Amplitude Modulation In Carrier Systems"

In Part 2 of Arthur L. Albert's "Amplitude Modulation in Carrier Systems," near the top of the middle column on page 27 of the Sept. 12 issue of TELEPHONY, appears the statement, "Measurements with a wave analyzer gave 1.2 volts." The amount should be 0.12 volt.

How about This

DIRECTORY COVER BUSINESS?

By LaMar S. Stoops*

PLEASE bear in mind while reading this treatise on directory covers, that only one objective is in mind; that is, an attempt to create a climate in our exchanges that would dry up the market for "foreign bill-board" directory cover sales and distribution to our patrons. And, all this without recourse to courts of law and without offense to our patrons. With that statement of purpose, let us now turn the pages back to October, 1957, and relate our experiences to date.

In October, 1957, I prepared a paper under the title, "New Trends in Judicial and Regulatory Decisions," for the USITA Convention Commercial Conference. This paper dealt primarily with the subject as associated with directory covers. Although we thought a great deal about the "foreign" directory cover problem subsequent to the Chicago meeting, the subject was rather dormant for a period of about 18 months. Then an incident occurred which reactivated our interest in the situation and that incident was as follows:

Charles D. Ehinger, president of the Citizens Telephone Co., the Argos Telephone Co., and the Nappanee Telephone Co., and the current president of the Indiana Telephone Association, upon wishing to make a call from his home could not locate the telephone directory. Like all blind husbands, he logically inquired of madam quartermaster (to you bachelors, that is a loving wife), "Hey Peg, where's the telephone directory?" "Right under your nose," she said. And sure enough there it was, beautifully—and I use the word with repugnance — beautifully housed in a "foreign" cover plastered with "billboard" advertising.

Add one recruit to the "If You Can't Lick'em Join'em" club. Well, that isn't quite true, because Chuck (Ehinger) was already a convert, but just let's say with this incident he took out his "final papers."

Well, after kicking the subject around in several of our monthly Indiana Telephone Association fifth district committee meetings, I found much concern that the foreign cover business was getting worse, instead of better. As a result of these district discussions, I was invited to discuss the matter further at our annual Indiana Telephone Association convention last May in Indianapolis.

Inasmuch as the Indianapolis address was primarily the USITA Commercial Conference paper, brought down to date, we will take a look at a few excerpts from it in order to prepare the way for our activities following the Indiana Association meeting. So, turning the pages back—

LaMAR S. STOOPS

Let us break into the subject more directly by recognizing that, in some instances, we have a law, or commission ruling upheld by judicial procedure, prohibiting the attachment of unauthorized advertising covers to telephone directories. That is fine, and is as it should be, but we most surely should continue to fight for more and better regulations on the judicial front.

It is gratifying to note that the courts and commissions may, in some instances, be giving more weight to the premise, long accepted as gospel to us in the industry, that any revenues lost, advertising or otherwise, must of necessity ultimately be replaced in some other area, probably increased exchange rental rates chargeable right back to the consumer, whose interest the court or commission, is dedicated to protect. But, even with some little encouragement from the courts and commissions, we cannot expect to control this "foreign cover" business with policemen alone.

Now, let us get away from the legal aspects, which are admittedly in some respects encouraging, and in other respects very discouraging. We know our industry is sparing no effort to protect our interest on the legal front and that it will continue to do a bang up job

*Mr. Stoops is Vice President of Nappanee (Ind.) Telephone Co. and Argos (Ind.) Telephone Co., subsidiaries of Citizens Telephone Co. of Decatur, Ind.

on that score. But, let us not depend on the legal staff to carry the ball by themselves. It is better that we subject ourselves to a large shot of vitamin PUSH while there is still time, rather than involuntarily subject ourselves to a large shot of formaldehyde administered by the friendly undertaker.

This is a fast moving world, and services that satisfied our customers 10 years, yes five or even one year ago, are not necessarily fulfilling customer demands today. Naturally, we pride ourselves on the accomplishments of our great industry over the past years, and rightfully so. But, let us stop and think a moment and ask ourselves how many of the services we now provide have actually been forced upon us, and I might say, with some reluctance on the part of the industry as a whole. Recently, and we might as well be frank about it, we have been forced by public demand to provide many special services, now commonly accepted, such as answering devices, colored telephones, close speaking telephones, retractable cords, telephones for the hard-of-hearing, and many, many others.

Now let us get back to the "foreign" directory covers and ask ourselves why we have them to contend with. Surely there can be but one answer, the public apparently finds them useful. And, I dare say, that in all probability, many of you folks have some sort of directory cover on your own books, which common sense dictates as reasonable. And, how about paystation directory binders —accepted, and in fact provided by the industry for its own use. So let us *be reasonable*, and admit that directory covers, physically speaking, may well serve a useful purpose, in that they actually protect, and prolong the life of our books. Now "foreign" directory covers, with advertising thereon, are a horse of a different color.

Those foreigners who "ride free" on our covers are surely trespassers, unethical hitchhikers thumbing a ride in a gold plated Cadillac — and if you please, at our expense! Please note that I refer to the *producers* of the "foreign" covers, and *not* our local patrons who innocently fall victims to the unethical practices. In the past, most of us sold advertising on our own directory covers. We "cleaned up" our covers years ago, primarily because our merchants considered the covers so valuable that they fought for space. So, conceding that directory covers are prime space for advertising, we must logically conclude that the "foreign" salesmen will have no problem selling their product so long as they can give the prospective purchaser assurance that their covers will be used. That leaves us with a challenge to dilute, or eliminate—the subscriber's willingness or desire to attach the "bill-board" covers to their directories.

"Under the free economic system, the consumer remains the ultimate authority as to what will and will not be produced." "If the businessman fails to do his duty by the consumer, he eventually has no duty to perform." (The above appeared in one of our trade journals, which, in turn, quoted it from "Editorial Statement," in the *Wall Street Journal.*)

Bringing that economic philosophy down to date — thanks to a recent USITA bulletin—"When you go fishing, do you select a bait you like, or one you believe the fish will like?" As commercial folks, surely we are "businessmen," and in reality are operating under the free economic system. Wishful thinking cannot exempt us from the economic law of our land.

I believe it has been demonstrated that whatever the consumer wishes, he will obtain, by ethical means or otherwise. If we do not supply the services and devices our patrons want, then come "hell or high courts," somebody else will. So let us do something about it.

If, indeed, people find plastic covers useful, and I believe they do, then why do not WE provide them, with or without charge, as our own local situation may dictate? I cannot help but feel that if we provided attractive transparent plastic covers, without advertising, we would be able to control the "foreign" cover problem to our own benefit, financially and public relations wise. It is doubtful if a "foreign billboard" cover could find a place to roost if our patrons had a choice between *it*, and an attractive cover supplied by the *telephone company*. And, here, is where I am going to let my imagination take over.

This is no longer the age of black and white, this is the age of expression by color. People, particularly our good womenfolk, want harmony in their color schemes. Let's face it, many a housewife hides her telephone directory because the cover color or design does not harmonize with the surroundings. Today, we even find refrigerators, and other household appliances, on the market with color panels making it possible for the housewife to decorate to her own choosing. Does it seem unreasonable then, that that same housewife might like to have a choice of telephone directory cover color and design? She has that choice in practically every other area of her home, so why not make it possible for her to decorate her telephone book to her own liking? We have given her colored telephones and colored cords, so what's wrong with her choice in directory cover colors? Now, I am going to propose what may be a simple, and practical (I hope) solution for consideration.

My proposal is this, that WE, in one way or another, provide transparent plastic covers for our directories.

Before considering the cost of such a program, let us take a look at the advertising budget. Did you know that the Bell System spends approximately 88 cents per year per telephone for advertising? While I haven't the slightest idea what Independent companies are spending, I'll throw this in for what it's worth. In the Nappanee exchange, in 1958, we spent 35.4 cents, in Argos 62.8 cents (dial conversion year), and in the Decatur group, 31.3 cents per telephone for advertising. Those expenditures were all well below the Bell System's 88-cent figure. Please do not construe this to mean that I am advocating meeting the Bell figure. However, I am using it as a "yardstick."

First of all, let us consider the approximate cost (picking up the whole check ourselves) of supplying plastic covers for each subscriber station. We will have to use some "probabilities" here, of course. As a starting point then, let us assume that the average life of a plastic cover in service is three years. Then the annual per station cost would be about 8 cents—and I am using a cover cost of 24 cents for this calculation. But if we supply all subscribers with covers, how will we make replacements as they wear out? At the moment, the only practical way I can see to do it is to request that replacements be made only upon surrender—by the subscribers—of the old worn-out covers.

My second though on the matter of distribution is this (and, I might add that, at the moment, this is my choice method in the interest of "making haste slowly," or "going easy by jerks," when exploring a new field). Let's be selfish and face facts. The first place we want these covers is on the directories of our business subscribers. Witness the surprise on the "foreign cover" salesman's face when he is confronted with covers, supplied by the telephone company—on his clients' directories. I believe that would take too much wind out of his sale to permit continued navigation on his course of "crime." All right, assume we have given the business subscribers their cover, now what about the residence patrons?

The more I think about it, the more I like the idea I gave at the USITA Commercial Conference—using the "box top" idea, or more specifically, the directory coupon deal; that is, publishing a coupon in the Yellow Pages, entitling

a subscriber to purchase a clear plastic cover for 25 cents. The 25-cent charge would just about cover our costs, and would act as a control in eliminating abuses and unreasonable requests.

This program most surely would be relatively inexpensive. Let us assume that the residence cover deal under this plan will "break even." Then, what will the program cost per station per year, exchange-wide? Again, we must assume some probabilities. For this calculation I will assume that 25 per cent of total stations are classified "business" (including all PABX and other business extensions). We will also assume the average life of the plastic covers in this instance to be two years —this is probably an extremely conservative estimate. Now then, 25 per cent (business telephones) times 50 per cent (two-year life estimate) times 24 cents brings us to a calculated average annual cost of 3 cents per exchange station per year. That would, I believe, be the very maximum cost under the plan; that is, supplying covers for all business stations without cost, and selling covers, at approximately our cost, to the residence patrons.

Recently, through the cooperation of our directory company, L. M. Berry & Co., it has been determined that a good grade, two-column, plastic directory cover will cost in the neighborhood of 22 cents. Quantities of less than 10,000 will undoubtedly cost a little more, and quantities over 10,000 will obviously cost a little less. Then, too, higher-priced stock, as well as cheaper stock, is available.

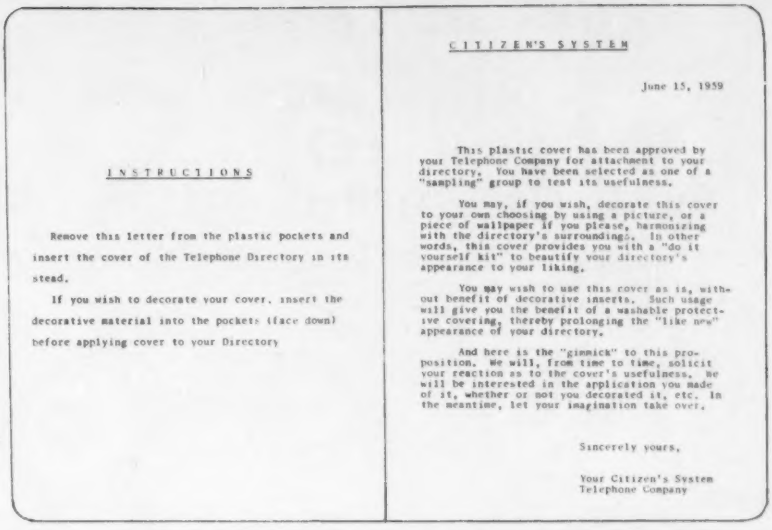
Let us not forget this, too. The industry is spending a lot of money in attempting to make their directories more attractive, and this is commendable. And, believe me, we all know that three-color printing jobs are not cheap. Furthermore, with the best of intentions, it is impossible to design a cover that will appeal to all—you just can't please everybody! But, with "do it yourself plastic covers" we can stick to the old reliable cover stock and apply the savings to the purchase of transparent plastic covers and make *everybody* happy—MAYBE.

Now, we come down to our conclusions, after considering and weighing all the problems as discussed heretofore.

Recently, we purchased 400 plastic covers for a "subscriber acceptance sampling."

The percent of our main line residence subscribers, selected at random, were mailed clear plastic covers, with a folder placed in the cover containing the message as shown in *Exhibit 1.*

About one week later we followed with a postage paid return questionnaire (post card), as shown in *Exhibit 2.* And it may be interesting to state here, that no other effort whatsoever was made to urge the return of the questionnaire card.



INSTRUCTIONS

Remove this letter from the plastic pockets and insert the cover of the Telephone Directory in its stead.

If you wish to decorate your cover, insert the decorative material into the pockets (face down) before applying cover to your Directory

CITIZEN'S SYSTEM

June 15, 1959

This plastic cover has been approved by your Telephone Company for attachment to your directory. You have been selected as one of a "sampling" group to test its usefulness.

You may, if you wish, decorate this cover to your own choosing by using a picture, or a piece of wallpaper if you please, harmonizing with the directory's surroundings. In other words, this cover provides you with a "do it yourself kit" to beautify your directory's appearance to your liking.

You may wish to use this cover as is, without benefit of decorative inserts. Such usage will give you the benefit of a washable protective covering, thereby prolonging the "like new" appearance of your directory.

And here is the "gimmick" to this proposition. We will, from time to time, solicit your reaction as to the cover's usefulness. We will be interested in the application you made of it, whether or not you decorated it, etc. In the meantime, let your imagination take over.

Sincerely yours,

Your Citizen's System
Telephone Company

EXHIBIT 1. Both sides of folder mailed out with plastic directory covers to main line residence subscribers.

The summary report, *Exhibit 3* on page 46, was compiled from the Nappanee survey only, inasmuch as the results of the Decatur survey have not been compiled as of this writing. However, the Decatur survey appears to coincide very closely with that reported for Nappanee.

Well, the survey surely erased any doubts in our minds as to whether or not people find plastic covers useful.

A few remarks, which are representative of all of the favorable replies are as follows:

"Very useful and practical for I put all emergency numbers on pink sheet in back of directory. In case we need one of them it is right there. Saves time for you don't get all fussed trying to find them."

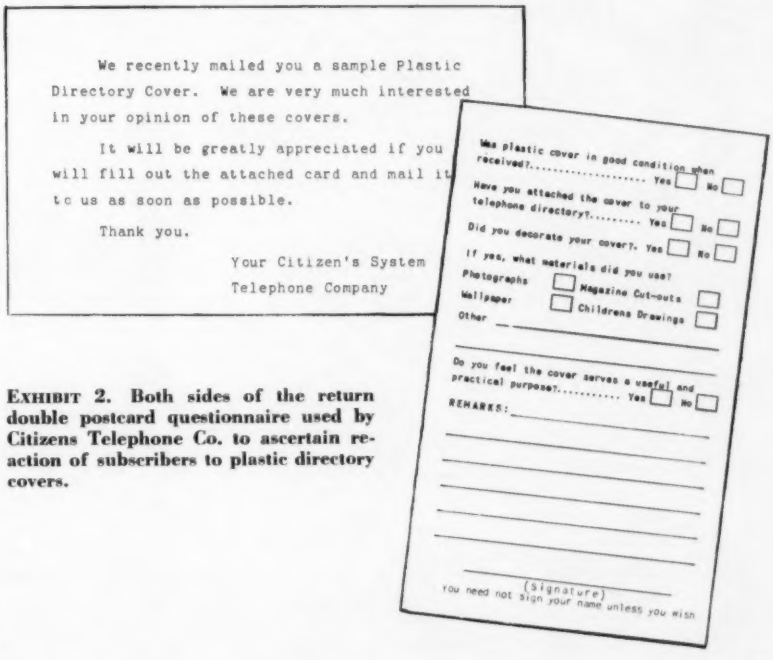
•

"I like it because it keeps the book in good condition."

•

"Yes, I like it, however, there should

(Please turn to page 44)



We recently mailed you a sample Plastic Directory Cover. We are very much interested in your opinion of these covers.

It will be greatly appreciated if you will fill out the attached card and mail it to us as soon as possible.

Thank you.

Your Citizen's System
Telephone Company

Was plastic cover in good condition when received?..... Yes ☐ No ☐

Have you attached the cover to your telephone directory?..... Yes ☐ No ☐

Did you decorate your cover? Yes ☐ No ☐

If yes, what materials did you use?

Photographs ☐ Magazine Cut-outs ☐

Wallpaper ☐ Childrens Drawings ☐

Other _____

Do you feel the cover serves a useful and practical purpose?..... Yes ☐ No ☐

REMARKS: _____

(Signature)
You need not sign your name unless you wish

EXHIBIT 2. Both sides of the return double postcard questionnaire used by Citizens Telephone Co. to ascertain reaction of subscribers to plastic directory covers.

How to Measure Insertion Loss

By JOHN V. BUSCEMI and
PAUL G. LAMBIDAKIS*

PART 2

IN PART I (Sept. 26 issue) we discussed the background of insertion loss measurements including instrumentation. This part will largely include practical examples.

Measurement of the Insertion Gain of a Negative Impedance Type Voice Repeater: The procedure and results which follow are from data taken on terminating links at an actual installation before cut-over. To find the insertion gain of a voice repeater applied to a terminating link:

(1) Measure the insertion loss of the *non-repeatered* facility through a band of frequencies in the voice range.

(2) Connect the repeater as recommended by the manufacturer (in practice, many present-day types are readily jacked in and out); then measure the insertion loss (or gain) of the *repeatered* facility.

(3) The algebraic difference between (1) and (2) at each frequency is the insertion gain.

Fig. 7 (Example 7) indicates the test

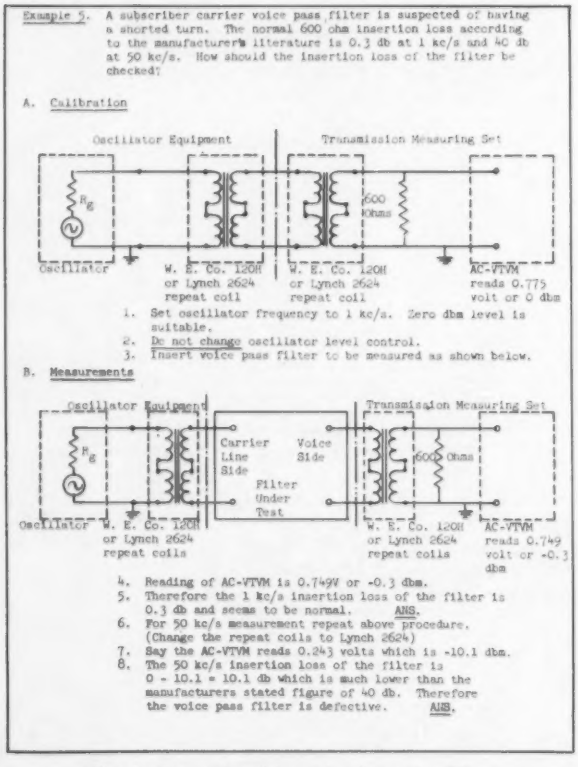

Example 5. A subscriber carrier voice pass filter is suspected of having a shorted turn. The normal 600 ohm insertion loss according to the manufacturer's literature is 0.3 db at 1 kc/s and 40 db at 50 kc/s. How should the insertion loss of the filter be checked?
A. Calibration
Oscillator Equipment
Transmission Measuring Set
Oscillator
W. E. Co. 12OH or Lynch 2624 repeat coil
W. E. Co. 12OH or Lynch 2624 repeat coil
600 Ohms
AC-VTVM reads 0.775 volt or 0 dbm
1. Set oscillator frequency to 1 kc/s. Zero dbm level is suitable.
2. Do not change oscillator level control.
3. Insert voice pass filter to be measured as shown below.
B. Measurements
Oscillator Equipment
Transmission Measuring Set
Carrier Line Side
Voice Side
Filter Under Test
600 Ohms
Oscillator
W. E. Co. 12OH or Lynch 2624 repeat coils
W. E. Co. 12OH or Lynch 2624 repeat coils
AC-VTVM reads 0.749 volt or -0.3 dbm
4. Reading of AC-VTVM is 0.749V or -0.3 dbm.
5. Therefore the 1 kc/s insertion loss of the filter is 0.3 db and seems to be normal. ANS.
6. For 50 kc/s measurement repeat above procedure. (Change the repeat coils to Lynch 2624)
7. Say the AC-VTVM reads 0.243 volts which is -10.1 dbm.
8. The 50 kc/s insertion loss of the filter is 0 - 10.1 = 10.1 db which is much lower than the manufacturers stated figure of 40 db. Therefore the voice pass filter is defective. ANS.

Fig. 5. Example of insertion loss of a filter.

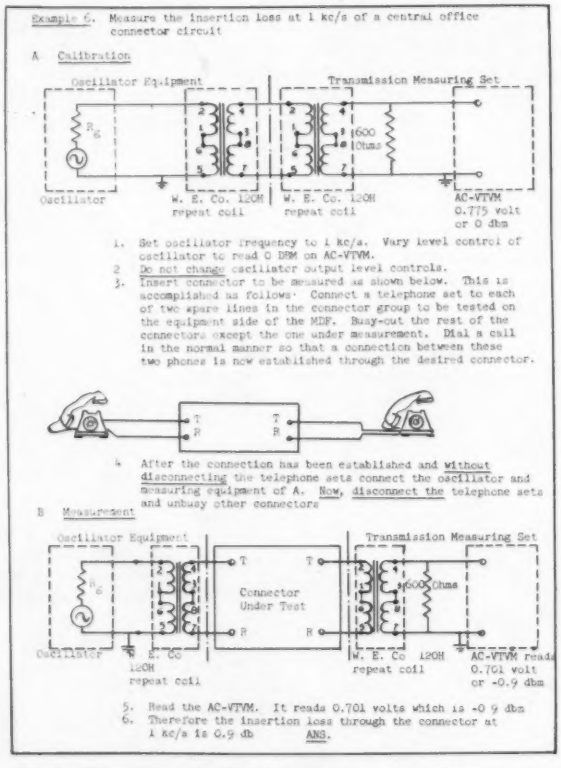

Example 6. Measure the insertion loss at 1 kc/s of a central office connector circuit
A Calibration
Oscillator Equipment
Transmission Measuring Set
Oscillator
W. E. Co. 12OH repeat coil
W. E. Co. 12OH repeat coil
600 Ohms
AC-VTVM 0.775 volt or 0 dbm
1. Set oscillator frequency to 1 kc/s. Vary level control of oscillator to read 0 DBM on AC-VTVM.
2. Do not change oscillator output level controls.
3. Insert connector to be measured as shown below. This is accomplished as follows. Connect a telephone set to each of two spare lines in the connector group to be tested on the equipment side of the MDF. Busy-out the rest of the connectors except the one under measurement. Dial a call in the normal manner so that a connection between these two phones is now established through the desired connector.
4. After the connection has been established and without disconnecting the telephone sets connect the oscillator and measuring equipment of A. Now, disconnect the telephone sets and unbusy other connectors
B Measurement
Oscillator Equipment
Transmission Measuring Set
Connector Under Test
600 Ohms
Oscillator
W. E. Co 12OH repeat coil
W. E. Co 12OH repeat coil
AC-VTVM reads 0.701 volt or -0.9 dbm
5. Read the AC-VTVM. It reads 0.701 volts which is -0.9 dbm
6. Therefore the insertion loss through the connector at 1 kc/s is 0.9 db ANS.

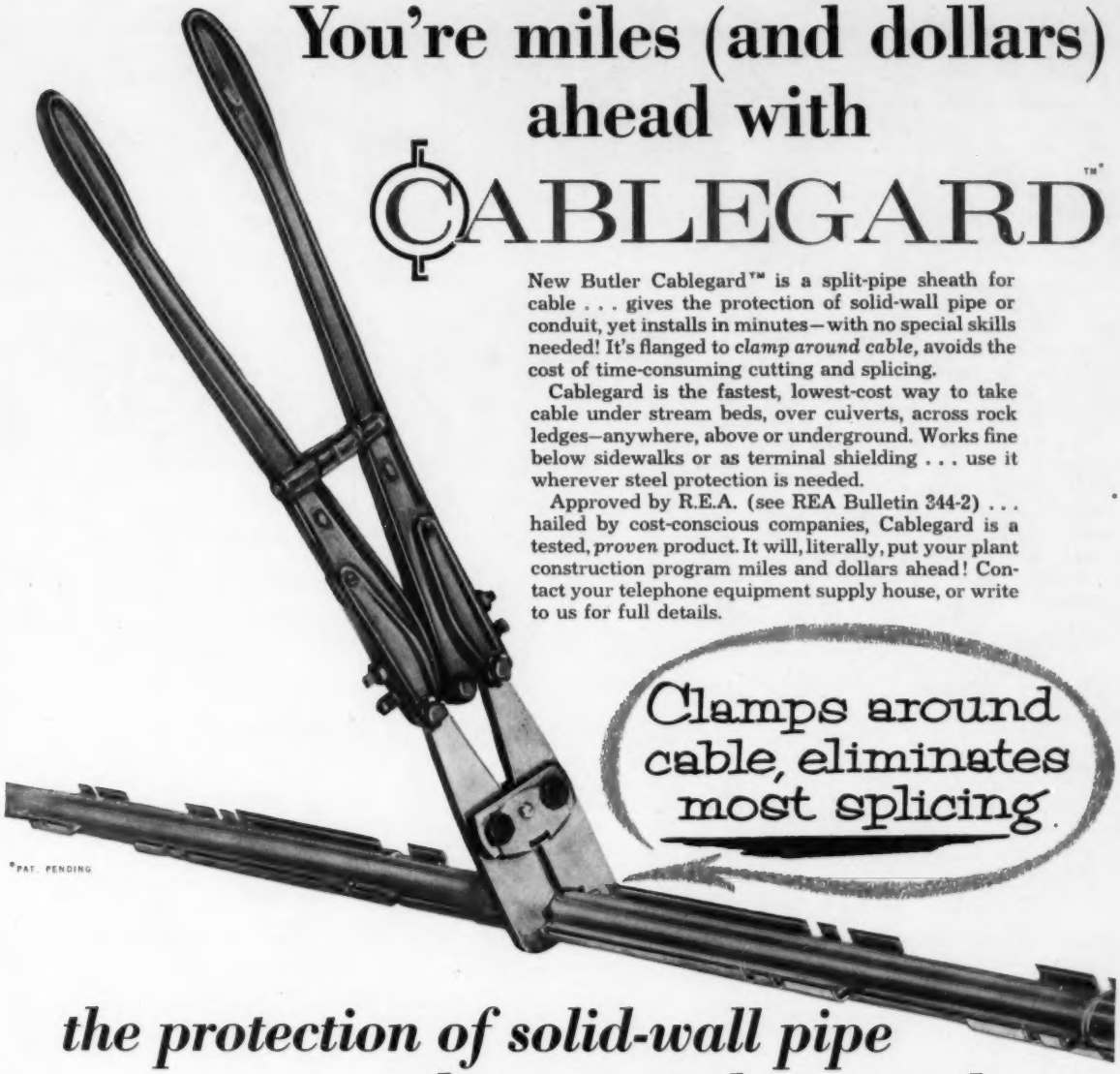
Fig. 6. Measurement of insertion loss of connector circuit.

You're miles (and dollars) ahead with CABLEGARD™

New Butler Cablegard™ is a split-pipe sheath for cable . . . gives the protection of solid-wall pipe or conduit, yet installs in minutes—with no special skills needed! It's flanged to *clamp around cable*, avoids the cost of time-consuming cutting and splicing.

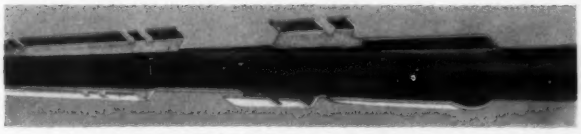
Cablegard is the fastest, lowest-cost way to take cable under stream beds, over culverts, across rock ledges—anywhere, above or underground. Works fine below sidewalks or as terminal shielding . . . use it wherever steel protection is needed.

Approved by R.E.A. (see REA Bulletin 344-2) . . . hailed by cost-conscious companies, Cablegard is a tested, *proven* product. It will, literally, put your plant construction program miles and dollars ahead! Contact your telephone equipment supply house, or write to us for full details.

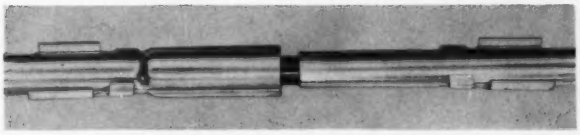


*PAT. PENDING

the protection of solid-wall pipe . . . above or underground



1. Place cable in bottom half of Cablegard (flanges up).



2. Lay top of Cablegard section over cable. Belled ends must match. Sections come straight or pre-curved, fit perfectly.

3. Open tool. Fit tabs into notches in tool jaws.

4. Close tabs—joints are securely locked.

BUTLER

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setup for all frequencies of interest and facilities as well as T.M.S. readings at 1000 cps.

However, omitted from the figure is another trunk pair used as an order wire between Offices A and C during the measurements, one man being required at each. A frequency run was made first in accordance with *Fig. 7-I.*

At each frequency, the double-pole double-throw switch was first thrown for calibration (to the left in the figure) and the oscillator output level adjusted so that the T.M.S. in Office A read zero DBM. Then it was thrown to connect to the facility (and its insertion loss) between the O.E. at Office A and the T.M.S. at Office C.

When the frequency run was completed, the repeater was connected per *Fig. 7-II* and the same procedure repeated again to find the repeated facility insertion loss. The difference between the two is the repeater insertion gain. Data are shown in *Table II* and plotted in *Fig. 8.*

Frequency Setting of O.E. in cps At Office A	Nonrepeatered Facility Insertion Loss in DB (- Meter reading in DBM at Office C, Figure 7-I (b))	Repeatered Facility Insertion Loss in DB (- Meter reading in DBM at Office C, Figure 7-II (b))	Repeater Insertion Gain in DB
250	- 9.1	- 3.4	5.9
500	- 10.8	- 3.8	7.0
750	- 11.2	- 2.6	8.6
1000	- 11.2	- 2.3	8.9
1200	- 11.3	- 3.2	8.1
1400	- 11.2	- 1.7	9.5
1600	- 11.4	- 2.7	8.7
1800	- 11.3	- 1.5	9.8
2000	- 11.8	- 3.5	8.3
2200	- 11.9	- 1.5	10.4
2400	- 12.2	- 1.4	10.8
2600	- 12.7	- 1.6	11.1
2800	- 13.1	- 3.1	10.0
3000	- 14.4	- 4.9	9.5
3100	- 15.8	- 6.7	9.1
3200	- 18.1	- 12.0	6.1
3300	- 28.5	- 16.5	12.0

Table II. Insertion loss and repeater insertion gain measurements on loaded repeatered cable (refer to Fig. 7).

As we said before, once the O.E. output is calibrated for zero DBM, the numerical value of minus DBM appearing at the far-end (Office C) T.M.S. is numerically equal to DB's of insertion loss.

It normally is not necessary to measure gain at as many frequencies as we did here. In this case, the repeater was of a new design and we were interested in detailed information which would not be necessary once familiarity with that particular type was acquired.

The concept of "effective loss" considers the unevenness of loss with frequency. One method used, takes an average of the losses at the number of frequencies in the useful voice band. If we average the repeatered facility insertion loss at 250, 500, 1000, 2000 and

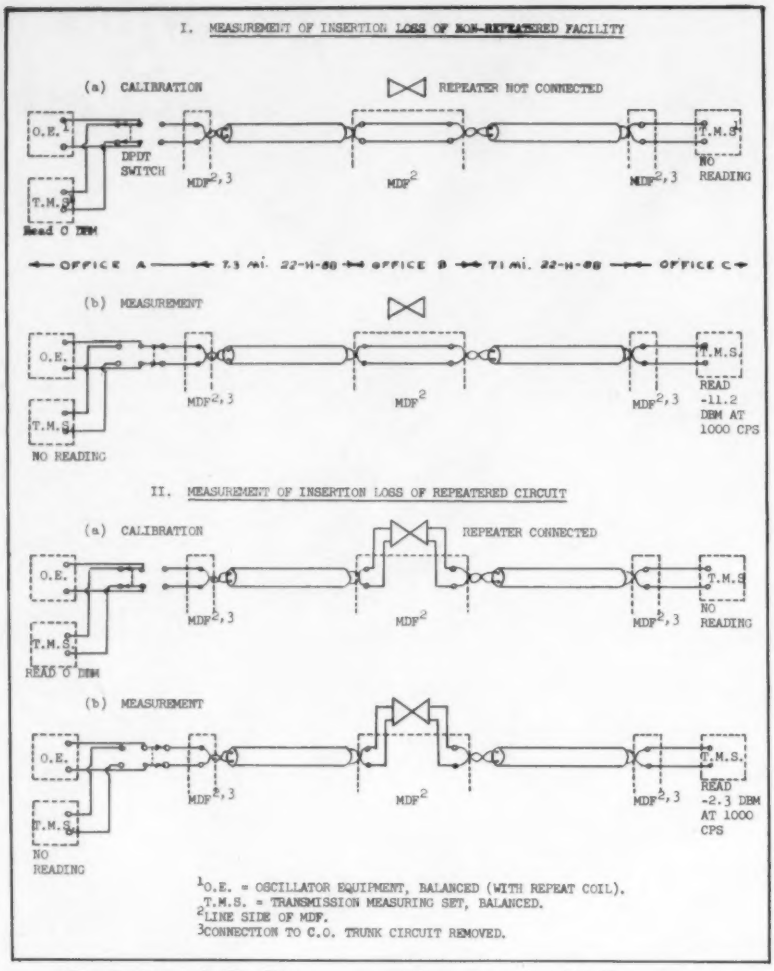

Fig. 7 (Example 7). Measurement of insertion gain of V. F. repeater.

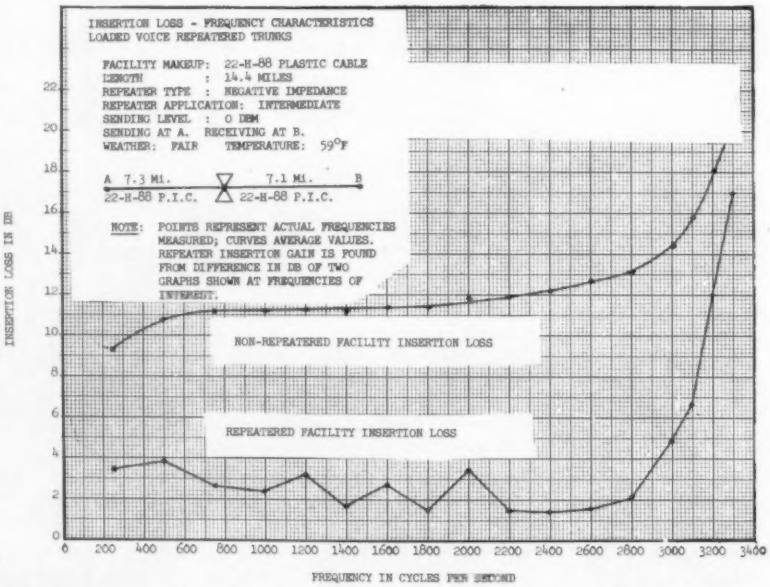
INSERTION LOSS - FREQUENCY CHARACTERISTICS
LOADED VOICE REPEATERED TRUNKS
FACILITY MAKEUP: 22-H-88 PLASTIC CABLE
LENGTH : 14.4 MILES
REPEATER TYPE : NEGATIVE IMPEDANCE
REPEATER APPLICATION: INTERMEDIATE
SENDING LEVEL : 0 DBM
SENDING AT A. RECEIVING AT B.
WEATHER: FAIR TEMPERATURE: 59°F
A 7.3 Mi. 7.1 Mi. B
22-H-88 P.I.C. 22-H-88 P.I.C.
NOTE: POINTS REPRESENT ACTUAL FREQUENCIES MEASURED; CURVES AVERAGE VALUES. REPEATER INSERTION GAIN IS FOUND FROM DIFFERENCE IN DB OF TWO GRAPHS SHOWN AT FREQUENCIES OF INTEREST.
NON-REPEATERED FACILITY INSERTION LOSS
REPEATERED FACILITY INSERTION LOSS
INSERTION LOSS IN DB
0 2 4 6 8 10 12 14 16 18 20 22
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400 2600 2800 3000 3200 3400
FREQUENCY IN CYCLES PER SECOND

Fig. 8. Insertion loss-frequency characteristic of loaded, repeatered trunk (Example 7).

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	Equipment engineers for application and collateral engineering liaison between engineering, manufacturing and installation.	Technical writers for preparation of instruction books, operating manuals, maintenance manuals.

USITA INTERVIEWS: Mr. Ben E. Jeffries, Manager of Technical Employment, will be in Chicago during the USITA show to interview interested applicants. For more information or an interview appointment, call Mr. Jeffries at WAbash 2-7992 between 9:00 a.m. and 8:00 p.m. October 12 and 13, or between 9:00 a.m. and 2:00 p.m. October 14. Or, send your resume in confidence to Mr. Jeffries at the address below.

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3000 cps, we find the loss to be about 3.6 db.

The smoothness of the non-repeatered facility insertion loss characteristic in *Fig. 8* is no coincidence. As must be done for any loaded cable to be properly repeatered as a terminating link, the telephone company paid careful attention to capacitance deviations, by working with its cable supplier; also to the location of loading coils, which were placed within less than one per cent of the theoretical (6000-foot loading section, 3000-foot end section) spacing.

It happens that we also made return loss measurements on this trunk and they were highly satisfactory. If this were not the case, the insertion loss characteristic would be more "bumpy."

Checking on Whether Results Obtained are "Reasonable": During the course of measurements, it is natural to want to know if they are "reasonable." A few table look-ups and calculations, at least at 1000 cps in the case of loaded cable, can quickly uncover any gross error in test setup or procedure.

Four factors should be considered in estimating facility insertion loss: attenuation, reflection, interaction and absorption peaks.

Attenuation is often confused with insertion loss but, usually, they are not the same thing. The two are equal when one or both of the terminating impedances is equal to the characteristic impedance of the facility. This condition may be approximated at higher carrier frequencies, when the impedance of either open wire or cable tends to remain nearly constant with frequency, with little reactance, but this is not always the case.

There are many sources of tables of attenuation data available. We use the data in "REA Telephone Engineering and Construction Manual," Sections 406 and 431. Most such tables specify the temperature at which the data apply; and usually, for non-cable conductors, that data apply to "wet" facilities because attenuation for any facility will change as temperature or degree of wetness varies. For the 22 H88 cable in Example 7 the 1000 cps attenuation at 68°F is given as 0.79 db/mile.

Table III gives factors which may be used to correct approximately for attenuation at temperatures different from that specified in the attenuation tables. The value of "D" obtained from Table III is entered into the formula,

$$F_T = 1 - \frac{T_A - T_B}{100 \times D}$$

where,

F_T = Temperature Correction Factor

T_A = Temperature, in degrees Fahrenheit, at which attenuation is known.

T_B = Temperature, in degrees Fahrenheit, recorded during measurements.

Class of Facilities	Approximate No. of Degrees Fahrenheit change for 1% Change in Attenuation = D
Loaded Cable, Voice Frequencies	5
Non-Loaded Cable, Voice Frequencies	10
Non-loaded cable, Carrier Frequencies	10
Open-wire, Voice Frequencies	10
Open-wire, Carrier Frequencies	5

Table III. Temperature correction factors.

To obtain the estimated attenuation per mile of the measured facility, multiply the published attenuation by F_T.

The temperature during our measurements in Example 7 was about 59°F. From Table III the value of D for loaded cable is 5. Substituting in the formula,

$$F_T = 1 - \frac{68 - 59}{100 \times 5} = 0.982$$

The estimated attenuation per mile is,

$$0.792 \frac{DB}{mile} \times 0.982 = 0.778 \frac{DB}{mile}$$

If a measurement is made during dry weather on a non-cable facility such as open wire, we would like to be able to estimate what the attenuation should be, considering the lack of wetness. *Table IV* gives factors which may be used to approximately correct attenuation data on "wet" facilities to that for "dry." Although the values applying to open wire in Table IV (and Table V, following) assume 8-inch average spaced facilities, they may be applied to 12-inch spaced facilities with negligible error.

Reflection Losses occur whenever the impedance of a termination is different from the characteristic impedance or facilities of different characteristic impedances are joined. If *one* of the terminating impedances is the same as the characteristic impedance, there is a reflection, but it is "calibrated out" to give the same DB's for insertion loss as for attenuation. If both terminations are different from the characteristic impedance, attenuation loss and insertion loss will not generally be the same.

It is possible for the magnitude and angle of these impedances to combine in such a manner as to produce a "reflection gain." Reflection losses up to 400 KC/S are included as *Table V*, and are given for frequency ranges where the reflection losses between some facilities change significantly. Table V shows that in the case of our 22 H88 cable a reflection loss of 0.3 db will have to be considered at each 600-ohm termination. (Table V is on page 28.)

Interaction Losses. Interaction losses are a further extension of reflection losses. They represent the sum total of all possible reflections traveling back and forth in the line as a result of impedance mismatches between the O.E., facilities and load as modified by the attenuation of the line.

The relation which describes interaction losses is not readily adaptable to tabulation. Based on a limited number of calculations we made on some commonly used facilities, the interaction loss apparently can cause the measured insertion loss to be different from the sum of attenuation plus reflections by something less than one db for each facility in the line. This is true where the line insertion loss is less than 10 db.

For line losses greater than about 10 db, interaction may safely be ignored in insertion loss measurements. They may therefore be thought to have negligible effect on our loaded cable insertion loss measurement.

Absorption Peaks will occur in all

Factors by Which "Wet" Attenuation should be Multiplied to Obtain "Dry" Attenuation for Various 8-Inch Spaced Facilities.

Frequency in KC	Copper - Steel				.104" CU	.109" Steel "A" Coated
	.080" (30%)	.080" (40%)	.102" (30%)	.104" (40%)		
1	.96	.99	.99	.97	.93	.94
50	.95	.90	.90	.86	.83	.98
100	.92	.89	.87	.85	.80	.98
200	.86	.85	.82	.82	.77	.98
300	.84	.82	.79	.80	.74	.90
360	.81	.79	.77	.78	.72	.88

Table IV. "Wet" to "dry" attenuation correction factors.

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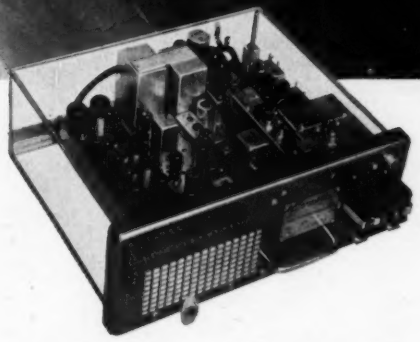

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Cable Characteristics: at 1 KC/S. [All Paper Insulated]

26 GA: 0.079 mfd/mi.
24 GA: 0.084 mfd/mi.
22 GA: 0.082 mfd/mi.
19 GA: 0.084 mfd/mi.

above 1 KC/S

24 GA: 0.088 mfd/mi. (Paper)
22 GA: 0.073 mfd/mi. (Plastic)
19 GA: 0.084 mfd/mi. (Paper)

Open Wire Characteristics:

8 inch spaced.

FACILITY	CABLE												OPEN WIRE							
	26 GA.			24 GA.				22 GA.				19 GA.				109 STEEL	COPPERWELD			104 COPPER	600 OHMS
	H88	B88	H44	N.L.	H88	B88	H44	N.L.	H88	B88	H44	N.L.	H88	B88	H44	85-135	190	30% 104	40% 104	30% 080	40% 080		
26 N.L.	-.2	-.1	-.1	+.1	-.3	-.2	-.1	+.3	-.4	-.4	-.2	+.9	-.5	-.5	-.3	0	+.1	-.1	-.1	0	-.1	-.2	-.4
26 H88	X	0	0	+.1	0	0	+.1	+.5	0	-.1	+.2	+1.2	0	-.1	+.3	0	0	+.2	+.2	0	+.1	+.4	.4
26 B88		X	0	+.2	+.1	0	+.3	+.8	+.2	0	+.5	+1.8	+.2	0	+.6	0	-.1	+.3	+.5	0	+.2	+.7	.9
26 H44			X	0	-.1	0	0	+.4	-.2	-.2	+.1	+1.0	+.2	-.2	0	+.1	+.1	0	+.1	0	0	+.1	.1
24 N.L.				X	-.1	+.1	-.1	+.1	-.1	-.1	-.2	+.5	-.5	-.2	-.4	+.2	+.4	-.2	-.2	+.2	-.1	-.3	-.6
24 H88					X	+.1	0	+.2	0	0	+.2	+1.0	0	0	+.2	0	0	+.1	+.1	0	0	+.3	.4
24 B88						X	+.2	+.6	+.2	0	+.4	+.6	+.2	0	+.6	-.1	-.1	+.2	+.4	0	+.1	+.6	.9
24 H44							X	+.1	-.1	+.1	0	+.6	-.1	0	0	+.2	+.3	0	0	0	0	0	0
22 N.L.								X	0	+.4	-.1	+.1	-.2	+.4	-.3	+.8	+.9	0	0	+.5	+.2	-.3	-.6
22 H88									X	+.1	-.1	+.7	0	+.1	+.2	0	0	0	0	-.2	-.1	+.2	.1
22 B88										X	+.3	+1.3	+.1	0	+.5	-.2	-.2	+.1	+.3	-.2	0	+.5	.7
22 H44											X	+.3	0	+.3	0	+.3	+.4	0	0	+.1	0	0	0
19 N.L.												X	+.5	+1.2	0	+1.5	+1.8	+.5	+.4	+1.1	+.7	0	-.4
19 H88													X	+.1	+.1	0	0	-.1	0	-.3	-.1	+.1	.3
19 B88														X	+.4	-.2	-.2	+.1	+.2	-.1	0	+.5	.7
19 H44															X	+.4	+.5	0	-.1	0	0	0	0
109 Steel (85 or 135)																X	0	+.2	+.3	+.1	+.2	+.4	.6
109 Steel (190)																	X	+.1	+.4	+.1	+.2	+.6	.7
104 C.W. 30%																		X	0	+.2	0	0	0
104 C.W. 40%																			X	+.2	+.1	0	-.1
080 C.W. 30%																				X	0	+.2	.1
080 C.W. 40%																					X	+.1	0

2.5 KC/S. (Use Also For 1 to 3.5 KC/S)

Facility	Cable			Open Wire						600 ohm resistive
	24 GA	22 GA	19 GA	.109" Steel	.104" CU	.104" (40) C-S	.102" (30) C-S	.080" (40) C-S	.080" (30) C-S	
24 GA	—	0	0.8	1.1	-0.3	-0.2	0	0.1	0.1	-0.4
22 GA	0	—	0	1.0	-0.2	0	0.1	0.2	0.4	-0.4
19 GA	0.2	0	—	2.3	0.4	0.7	0.9	1.0	1.2	0.1
.109" Steel	1.1	1.0	2.1	—	0.4	0.4	0.1	0.1	0.2	0.4
.104" CU	-0.3	-0.2	0.4	0.4	—	0	0	0	0	0
.104" (40) C-S	0.2	0	0.7	0.4	0	—	0	0	0	0
.102" (30) C-S	0	0.1	0.9	0.1	0	0	—	0	0	0
.080" (40) C-S	0.1	0.2	1.0	0.1	0	0	0	—	0	-0.1
.080" (30) C-S	0.1	0.4	1.2	0.2	0	0	0	0	—	-0.1
600 Ohms	-0.4	0.4	0.1	0.4	0	0	0	-0.1	-0.1	—

5 KC/S. (Use Also For 3.5 to 6 KC/S)

Cable			Open Wire						600 ohm resistive
24 GA	22 GA	19 GA	.109" Steel	.104" CU	.104" (40) C-S	.102" (30) C-S	.080" (40) C-S	.080" (30) C-S	
—	0	0.1	0.8	-0.1	0.1	0.2	0.3	0.5	-0.1
0	—	0.2	0.9	0.1	0.3	0.4	0.5	0.6	0.1
0.2	0.2	—	2.9	1.1	1.3	1.4	1.6	1.7	1.1
0.8	0.9	2.9	—	0.3	0.3	0.3	0.2	0.2	0.1
-0.1	0.1	1.1	0.3	—	0	0	0	0	0
0.1	0.3	1.3	0.3	0	—	0	0	0	0
0.2	0.4	1.4	0.3	0	0	—	0	0	0
0.3	0.5	1.6	0.2	0	0	0	—	0	0
0.5	0.6	1.7	0.2	0	0	0	0	—	0.1
-0.1	0.1	1.1	0.1	0	0	0	0	0.1	—

7.5 KC/S. (Use Also For 6.0 to 8.5 KC/S)

Facility	Cable			Open Wire						600 ohm resistive
	24 GA	22 GA	19 GA	.109" Steel	.104" CU	.104" (40) C-S	.102" (30) C-S	.080" (40) C-S	.080" (30) C-S	
24 GA	—	0	0.1	1.5	0.2	0.3	0.4	0.5	0.6	0.2
22 GA	0	—	0.2	2.1	0.6	0.7	0.8	0.9	0.9	0.6
19 GA	0.1	0.2	—	3.2	1.7	1.8	1.8	2.0	2.1	1.3
.109" Steel	1.5	2.1	3.2	—	0.2	0.2	0.2	0.1	0.1	0.2
.104" CU	0.2	0.6	1.7	0.2	ZERO					
.104" (40) C-S	0.3	0.7	1.8	0.2						
.102" (30) C-S	0.4	0.8	1.8	0.2						
.080" (40) C-S	0.5	0.9	2.0	0.1						
.080" (30) C-S	0.6	0.9	2.1	0.1						
600 ohms resistive	0.2	0.6	1.3	0.2						

10 KC/S. (Use Also For 8.5 to 15 KC/S)

Cable			Open Wire						600 ohms resistive
24 GA	22 GA	19 GA	.109" Steel	.104" CU	.104" (40) C-S	.102" (30) C-S	.080" (40) C-S	.080" (30) C-S	
—	0	0.2	1.9	0.6	0.7	0.7	0.8	0.9	0.6
0	—	0.2	2.2	1.0	1.0	1.1	1.1	1.1	0.9
0.2	0.2	—	3.4	2.1	2.1	2.1	2.1	2.1	2.1
1.9	2.2	3.4	—	0.1	0.2	0.2	0.1	0.1	0.1
0.6	1.0	2.1	0.1	ZERO					
0.7	1.0	2.1	0.2						
0.7	1.1	2.1	0.2						
0.8	1.1	2.1	0.1						
0.9	1.1	2.1	0.1						
0.6	0.9	2.1	0.1						

Note: Negative sign indicates reflection gain.

Table V. Reflection losses in DB for various dissimilar facilities (continued on next page).

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transposed open wire pairs at some frequencies, and when they do will always cause a transmission loss.

Though the physical phenomenon of the absorption peak is not very well understood, it manifests itself as follows in an open wire line: Undesired coupling from one pair to other wires (not necessarily the coupling between wires or an adjacent pair) results in energy loss in these wires in a band of frequencies making the line attenuation in excess of its normal loss.

We know of cases in which absorption peaks have been severe enough to render a wire pair, which was well within limits as far as attenuation plus reflections was concerned, inoperable at some carrier frequencies. Where insertion loss at carrier frequencies shows a loss not accounted for by attenuation, reflection and interaction, absorption peaks may be suspected.

An approximate formula for estimating the center of the lowest frequency range where serious excess loss due to absorption peaks will occur is,

$$f = \frac{240{,}000}{D}$$

where,

f = the center of the lowest frequency band in which a significant absorption peak may occur, in kilocycles.

D = the average distance between transpositions (not average pole spacing), in feet.

After f is found it should be divided by 1.15 to find the lower end of the band and multiplied by 1.15 to find the upper end. The frequency band thus found may contain one absorption peak or this band may have two or more peaks. There may be smaller absorption peaks at frequencies below this band but they usually are not of much importance.

Unfortunately, although we are able to estimate the lowest *frequency band* in which a serious absorption peak is likely to occur, we do not have an accurate method of estimating how much *excess loss*, in DB, is likely to occur due to an absorption peak.

An approximate formula for insertion loss, outside the possible absorption peak range, is therefore,

Insertion Loss = Attenuation (Corrected for weather and temperature) + reflection losses.

Now we can recapitulate what the 1000 cps loss of the cable in Example 7 should be, using the above formula, since absorption peaks are not experienced with cable,

$$\text{Insertion loss} = 0.778\ \frac{\text{DB}}{\text{mile}} \times (7.1 + 7.3)\ \text{miles} + 2 \times (0.3)\ \text{DB} = 11.8\ \text{DB}$$ ANS.

This compares with 11.2 DB, measured, which, considering normal errors in instrument readings, etc., is close enough for practical purposes.

Making Measurement on a Facility in the Presence of Noise: For the purpose of this discussion, we consider "noise" to be any signal which gives a reading on the T.M.S. at the far-end (such as Office C, Figure 7) of a facility when the O.E. is *not* sending on the facility at the near-end (such as Office A).

This does not necessarily mean that if there is a reading in the T.M.S., the noise will give a significant error in the insertion loss measurement after the O.E. is connected.

The rules are:

(1) When the noise reading (in DBM) is below the signal-plus-noise reading (in DBM) *by more than 15 DB*, the measurement can proceed as in Example 7.

(2) When the noise at the T.M.S. without the O.E. sending is between 1 and 15 db below that with the O.E. sending, we must correct for it.

(3) When the noise at the T.M.S. without the O.E. sending is less than 1 db below that with the O.E. sending, we must look toward a *frequency-selective AC-VTVM* and hope the interfering noise signal is not primarily at the frequency of the desired signal.

Where a measurement is made as in case (2) above, the correction factors of *Table VI* should be used to obtain the correct reading. To illustrate, suppose the noise was significant in Example 7, and the readings at 1000 cps were as follows:

20 KC/S. [Use Also For 15 to 25 KC/S]

Facility	Cable 24 GA	Cable 22 GA	Cable 19 GA	Open Wire .109" Steel	Open Wire .104" CU	Open Wire .104" (40) 0-S	Open Wire .104" (30) 0-S	Open Wire .080" (40) 0-S	Open Wire .080" (30) 0-S	600 ohms resistive
24 GA	—	0	0	2.5	1.4	1.5	1.5	1.5	1.5	1.4
22 GA	0	—	0.1	2.6	1.6	1.6	1.7	1.8	1.8	1.6
19 GA	0	0.1	—	3.5	2.6	2.6	2.6	2.8	2.8	2.6
.109" Steel	2.5	2.6	4.0	—	0.1	0.1	0.1	0.1	0.1	0.1
.104" CU	1.4	1.6	2.6	0.1	ZERO					
.104" (40) 0-S	1.5	1.6	2.6	0.1						
.104" (30) 0-S	1.5	1.7	1.8	0.1						
.080" (40) 0-S	1.5	1.8	2.8	0.1						
.080" (30) 0-S	1.5	1.8	2.8	0.1						
600 Ohms	1.4	1.6	2.6	0.1						

10 KC/S. [Use Also For 25 to 50 KC/S]

Cable 24 GA	Cable 22 GA	Cable 19 GA	Open Wire .109" Steel	Open Wire .104" CU	Open Wire .104" (40) 0-S	Open Wire .104" (30) 0-S	Open Wire .080" (40) 0-S	Open Wire .080" (30) 0-S	600 ohms resistive
—	0	0	2.6	1.7	1.8	1.8	2.0	2.0	1.7
0	—	0.1	2.2	1.2	1.2	2.0	2.2	2.2	1.2
0	0.1	—	4.0	2.2	2.2	2.2	3.1	3.1	2.2
2.6	2.2	4.0							
1.7	1.2	2.2							
1.8	1.2	2.2							
1.8	2.0	2.2							
2.0	2.2	3.1							
2.0	2.2	3.1							
1.7	1.2	2.2							

ZERO

100 KC/S. [Use Also For 50 to 200 KC/S]

Facility	Cable 24 GA	Cable 22 GA	Cable 19 GA	Open Wire .109" Steel	Open Wire .104" CU	Open Wire .104" (40) 0-S	Open Wire .104" (30) 0-S	Open Wire .080" (40) 0-S	Open Wire .080" (30) 0-S	600 ohms resistive
24 GA	—	0	0.1	3.4	3.0	3.0	3.0	3.2	3.2	3.0
22 GA	0	—	0	3.0	2.5	2.5	2.6	2.6	2.7	2.5
19 GA	0.1	0	—	3.7	3.0	3.0	3.1	3.1	3.1	3.0
.109" Steel	3.4	3.0	3.7							
.104" CU	3.0	2.5	3.0							
.104" (40) 0-S	3.0	2.5	3.0							
.104" (30) 0-S	3.0	2.6	3.1							
.080" (40) 0-S	3.2	2.6	3.1							
.080" (30) 0-S	3.2	2.7	3.1							
600 Ohms	3.0	2.5	3.0							

ZERO

200 KC/S. [Use Also For 100 to 400 KC/S]

Cable 24 GA	Cable 22 GA	Cable 19 GA	Open Wire .109" Steel	Open Wire .104" CU	Open Wire .104" (40) 0-S	Open Wire .104" (30) 0-S	Open Wire .080" (40) 0-S	Open Wire .080" (30) 0-S	600 ohms resistive
—	0	0.1	3.6	3.1	3.1	3.2	3.4	3.4	3.1
0	—	0.1	3.2	2.7	2.8	2.8	2.9	2.9	2.8
0.1	0.1	—	3.9	3.1	3.1	3.2	3.4	3.4	3.1
3.6	3.2	3.9							
3.1	2.7	3.1							
3.1	2.8	3.1							
3.2	2.8	3.2							
3.4	2.9	3.4							
3.4	2.9	3.4							
3.1	2.8	3.1							

ZERO

Table V (continued). Reflection losses in DB.

Frequency in cps..... 1000 cps
Noise-without-signal reading at Office C, T.M.S. of non-repeatered facility .. —22.0 DBM
Signal-plus-noise reading at Office C, T.M.S. of non-repeatered facility ..... —11.0 DBM
Noise-without-signal reading at Office C, T.M.S. of repeatered facility ..... —18.0 DBM
Signal-plus-noise reading at Office C, T.M.S. of repeatered facility ..... — 8.6 DBM

From Table VI, for non-repeatered facility,

D = —11.0 — (—22.0) = 11.0 DB
F = 0.2 DB

The value of F is then subtracted from the signal-plus-noise reading.

Non-repeatered Facility Insertion Loss in,

DB = —11.0 — 0.2 = —11.2 DB *ANS.*

For the repeatered facility, from Table VI,

D = —8.6 — (—18) = 9.4 DB
F = 0.3 DB

Subtracting the value of F from the signal-plus-noise reading.

Repeatered Facility Insertion Loss in DB = —8.6 — 0.3 = —8.9 DB *ANS.*

When the noise is in the case (3) category, that is the noise-without-signal reading practically equals signal-plus-noise reading, the noise energy must be kept out of the T.M.S. meter reading by means of a *frequency-selective AC-VTVM.*

The component of noise making the largest contribution is often at 60 cps, with 60 cps harmonics not far behind. The W. E. Co. 2B or the Daven Co. 34B Noise Measuring Set is frequency-selective in that its weighting network (either 144 or FIA) greatly de-emphasizes the effect of the 60 cycle component of a received signal.

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The instrument, though called a "noise measuring set," is actually exceptionally versatile and those who have worked with it will not be surprised that it is discussed as a transmission measuring set. Its flexibility does make it impracticable for detailed discussion of its operation here. However, the instruction book furnished with the instrument is quite complete.

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D	F	D	F
0.5	8.8	7.0	0.7
1.0	6.5	7.5	0.6
1.5	4.7	8.0	0.5
2.0	3.4	8.5	0.4
2.5	2.7	9.0	0.3
3.0	2.2	9.5	0.3
3.5	1.9	10.0	0.3
4.0	1.7	10.5	0.25
4.5	1.4	11	0.20
5.0	1.3	12	0.20
5.5	1.1	13	0.20
6.0	0.9	14	0.10
6.5	0.8	15	0.10

PROCEDURE: Measurements performed according to paragraph 9.03 in text.

1. D represents the difference of levels in db of steps 1 and 2, paragraph 9.03.
2. F is the value corresponding to above difference that must be subtracted from reading of step 1, par. 9.03 to obtain true signal level.

NOTE: Correction applies to average reading a.c.-vtvm such as H. P. 400D or H types or equivalent.

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In the carrier frequency range, a number of frequency selective AC-VTVM's are available. Two examples are the Sierra Electronic Corp. Model 108B Carrier Frequency Voltmeter and Railway Communications, Inc., "Rycom" Model 2174 Selective Voltmeter.

Carrier frequency receive levels are usually much lower than voice frequency levels (in DBM) and therefore the far-end T.M.S. reading is more apt to be obscured by interference from noise, powerful radio or operating wire line carriers. Because of this, a frequency selective AC-VTVM is almost always necessary where it is desired to measure carrier frequency losses on a wire pair.

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The test setup is shown in *Fig. 9* (Example 8). Bridle wire at the c.o. entrance cable-open wire junction was opened and single No. 12 copper, polyethylene-insulated wires were dropped to the base of the pole. A vehicle containing the necessary instrumentation was moved to the base of the pole at each end. Another pair was used to maintain voice communication between vehicles.

Instruments and repeat coils used were as described previously. In this type of measurement, it is necessary that the frequency selective voltmeter, which is part or all of the T.M.S. at location B depending on the type, be turned before each measurement is recorded.

The data, as recorded, is shown in *Table VII.* Prior to each measurement recorded in this table, the DPDT switch was thrown as in Fig. 9 (a) and the O.E. output adjusted to read O DBM on the AC-VTVM (untuned) included in the T.M.S. at location "A". Then the switch was thrown to measure the facility insertion loss as in Fig. 9 (b).

The insertion loss characteristic is plotted as *Fig. 10.* Although the pair starts to show a tendency toward ex-

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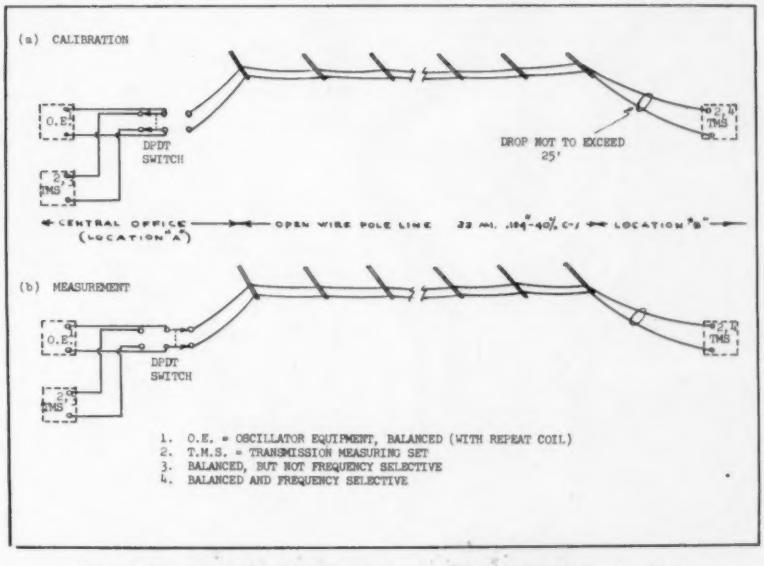

Fig. 9 (Example 8). Measurement of open wire line insertion loss.

transposed open wire pairs at some frequencies, and when they do will always cause a transmission loss.

Though the physical phenomenon of the absorption peak is not very well understood, it manifests itself as follows in an open wire line: Undesired coupling from one pair to other wires (not necessarily the coupling between wires or an adjacent pair) results in energy loss in these wires in a band of frequencies making the line attenuation in excess of its normal loss.

We know of cases in which absorption peaks have been severe enough to render a wire pair, which was well within limits as far as attenuation plus reflections was concerned, inoperable at some carrier frequencies. Where insertion loss at carrier frequencies shows a loss not accounted for by attenuation, reflection and interaction, absorption peaks may be suspected.

An approximate formula for estimating the center of the lowest frequency range where serious excess loss due to absorption peaks will occur is,

$$f = \frac{240{,}000}{D}$$

where,

f = the center of the lowest frequency band in which a significant absorption peak may occur, in kilocycles.

D = the average distance between transpositions (not average pole spacing), in feet.

After f is found it should be divided by 1.15 to find the lower end of the band and multiplied by 1.15 to find the upper end. The frequency band thus found may contain one absorption peak or this band may have two or more peaks. There may be smaller absorption peaks at frequencies below this band but they usually are not of much importance.

Unfortunately, although we are able to estimate the lowest *frequency band* in which a serious absorption peak is likely to occur, we do not have an accurate method of estimating how much *excess loss*, in DB, is likely to occur due to an absorption peak.

An approximate formula for insertion loss, outside the possible absorption peak range, is therefore,

Insertion Loss = Attenuation (Corrected for weather and temperature) + reflection losses.

Now we can recapitulate what the 1000 cps loss of the cable in Example 7 should be, using the above formula, since absorption peaks are not experienced with cable,

$$\text{Insertion loss} = 0.778 \frac{\text{DB}}{\text{mile}} \times (7.1 + 7.3) \text{ miles} + 2 \times (0.3) \text{ DB} = 11.8 \text{ DB} \quad \text{ANS.}$$

This compares with 11.2 DB, measured, which, considering normal errors in instrument readings, etc., is close enough for practical purposes.

Making Measurement on a Facility in the Presence of Noise: For the purpose of this discussion, we consider "noise" to be any signal which gives a reading on the T.M.S. at the far-end (such as Office C, Figure 7) of a facility when the O.E. is *not* sending on the facility at the near-end (such as Office A).

This does not necessarily mean that if there is a reading in the T.M.S., the noise will give a significant error in the insertion loss measurement after the O.E. is connected.

The rules are:

(1) When the noise reading (in DBM) is below the signal-plus-noise reading (in DBM) *by more than 15 DB*, the measurement can proceed as in Example 7.

(2) When the noise at the T.M.S. without the O.E. sending is between 1 and 15 db below that with the O.E. sending, we must correct for it.

(3) When the noise at the T.M.S. without the O.E. sending is less than 1 db below that with the O.E. sending, we must look toward a *frequency-selective AC-VTVM* and hope the interfering noise signal is not primarily at the frequency of the desired signal.

Where a measurement is made as in case (2) above, the correction factors of *Table VI* should be used to obtain the correct reading. To illustrate, suppose the noise was significant in Example 7, and the readings at 1000 cps were as follows:

20 KC/S. (Use Also For 15 to 25 KC/S)

Facility	Cable 24 GA	Cable 22 GA	Cable 19 GA	Open Wire .109" Steel	Open Wire .104" CU	Open Wire .104" (40) C-S	Open Wire .102" (30) C-S	Open Wire .080" (40) C-S	Open Wire .080" (30) C-S	600 ohms resistive
24 GA	—	0	0	2.5	1.4	1.5	1.5	1.5	1.5	1.4
22 GA	0	—	0.1	2.6	1.6	1.6	1.7	1.8	1.8	1.6
19 GA	0	0.1	—	3.5	2.6	2.6	2.6	2.8	2.8	2.6
.109" Steel	2.5	2.6	4.0	—	0.1	0.1	0.1	0.1	0.1	0.1
.104" CU	1.4	1.6	2.6	0.1						
.104" (40) C-S	1.5	1.6	2.6	0.1						
.102" (30) C-S	1.5	1.7	1.8	0.1						
.080" (40) C-S	1.5	1.8	2.8	0.1			ZERO			
.080" (30) C-S	1.5	1.8	2.8	0.1						
600 Ohms	1.4	1.6	2.6	0.1						

30 KC/S. (Use Also For 25 to 50 KC/S)

Cable 24 GA	Cable 22 GA	Cable 19 GA	Open Wire .109" Steel	Open Wire .104" CU	Open Wire .104" (40) C-S	Open Wire .102" (30) C-S	Open Wire .080" (40) C-S	Open Wire .080" (30) C-S	600 ohms resistive
—	0	0	2.6	1.7	1.8	1.8	2.0	2.0	1.7
0	—	0.1	2.2	1.2	1.9	2.0	2.2	2.2	1.9
0	0.1	—	4.0	2.9	2.9	2.9	3.1	3.1	2.9
2.6	2.9	4.8							
1.7	1.9	2.9							
1.8	1.9	2.9							
1.8	2.0	2.9				ZERO			
2.0	2.2	3.1							
2.0	2.2	3.1							
1.7	1.9	2.9							

100 KC/S. (Use Also For 50 to 200 KC/S)

Facility	Cable 24 GA	Cable 22 GA	Cable 19 GA	Open Wire .109" Steel	Open Wire .104" CU	Open Wire .104" (40) C-S	Open Wire .102" (30) C-S	Open Wire .080" (40) C-S	Open Wire .080" (30) C-S	600 ohms resistive
24 GA	—	0	0.1	3.4	3.0	3.0	3.0	3.2	3.2	3.0
22 GA	0	—	0	3.0	2.5	2.5	2.6	2.6	2.7	2.5
19 GA	0.1	0	—	3.7	3.0	3.0	3.1	3.1	3.3	3.0
.109" Steel	3.4	3.0	3.7							
.104" CU	3.0	2.5	3.0							
.104" (40) C-S	3.0	2.5	3.0							
.102" (30) C-S	3.0	2.6	3.1				ZERO			
.080" (40) C-S	3.2	2.6	3.1							
.080" (30) C-S	3.2	2.7	3.1							
600 Ohms	3.0	2.5	3.0							

300 KC/S. (Use Also For 200 to 400 KC/S)

Cable 24 GA	Cable 22 GA	Cable 19 GA	Open Wire .109" Steel	Open Wire .104" CU	Open Wire .104" (40) C-S	Open Wire .102" (30) C-S	Open Wire .080" (40) C-S	Open Wire .080" (30) C-S	600 ohms resistive
—	0	0.1	3.6	3.1	3.1	3.2	3.4	3.4	3.1
0	—	0.1	3.2	2.7	2.8	2.8	2.9	2.9	2.8
0.1	0.1	—	3.5	3.1	3.1	3.2	3.4	3.4	3.1
3.6	3.2	3.5							
3.1	2.7	3.1							
3.1	2.8	3.1							
3.2	2.8	3.2				ZERO			
3.4	2.9	3.4							
3.4	2.9	3.4							
3.1	2.8	3.1							

Table V (continued). Reflection losses in DB.

Frequency in cps..... 1000 cps
Noise-without-signal reading at Office C, T.M.S. of non-repeatered facility .. —22.0 DBM
Signal-plus-noise reading at Office C, T.M.S. of non-repeatered facility ..... —11.0 DBM
Noise-without-signal reading at Office C, T.M.S. of repeatered facility ..... —18.0 DBM
Signal-plus-noise reading at Office C, T.M.S. of repeatered facility ..... — 8.6 DBM

From Table VI, for non-repeatered facility,

D = —11.0 — (—22.0) = 11.0 DB
F = 0.2 DB

The value of F is then subtracted from the signal-plus-noise reading.

Non-repeatered Facility Insertion Loss in,

DB = —11.0 — 0.2 = —11.2 DB *ANS.*

For the repeatered facility, from Table VI,

D = —8.6 — (—18) = 9.4 DB
F = 0.3 DB

Subtracting the value of F from the signal-plus-noise reading.

Repeatered Facility Insertion Loss in DB = —8.6 — 0.3 = —8.9 DB *ANS.*

When the noise is in the case (3) category, that is the noise-without-signal reading practically equals signal-plus-noise reading, the noise energy must be kept out of the T.M.S. meter reading by means of a *frequency-selective AC-VTVM.*

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D	F	D	F
0.5	8.8	7.0	0.7
1.0	6.5	7.5	0.6
1.5	4.7	8.0	0.5
2.0	3.4	8.5	0.4
2.5	2.7	9.0	0.3
3.0	2.2	9.5	0.3
3.5	1.9	10.0	0.3
4.0	1.7	10.5	0.25
4.5	1.4	11	0.20
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5.5	1.1	13	0.20
6.0	0.9	14	0.10
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PROCEDURE: Measurements performed according to paragraph 9.03 in text.

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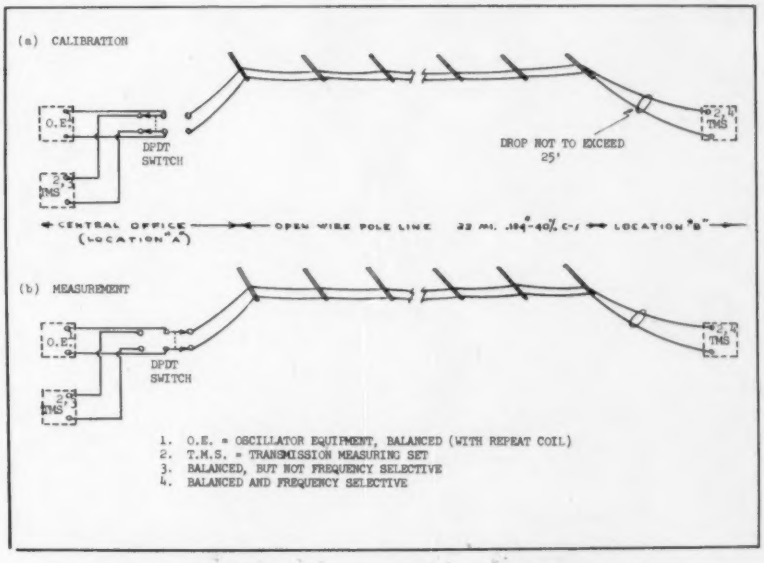
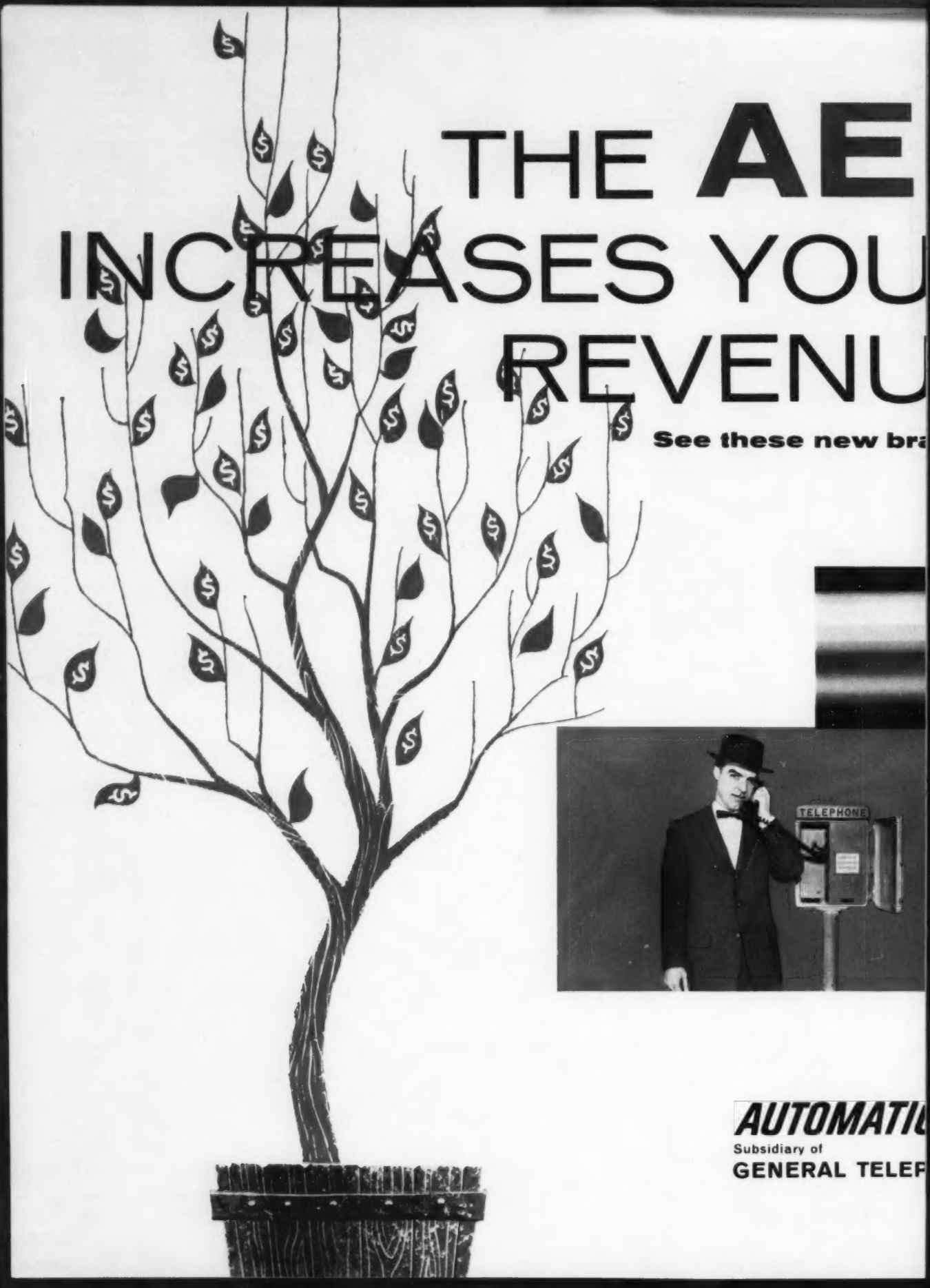


Fig. 9 (Example 8). Measurement of open wire line insertion loss.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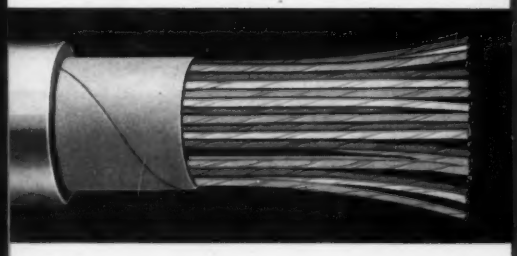

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cess loss above about 200 kc it is at 410 kc that the startling peak occurs. The average span length on this line was about 300 feet, and the average transposition interval about 600 feet (= D). Using our absorption peak formula,

$$F = \frac{240{,}000}{D}$$

we see that the maximum absorption in the measured range would be expected at around 400 kc which is a pretty good check.

Lining up a Trunk Carrier Channel For 1000 CPS Loss: There are various line-up procedures for carrier frequency and tone signals for different types of trunk carrier, some of which must properly be done prior to adjustment for 1000 cps insertion loss. We therefore shall not outline here a detailed example but review the 1000 cps lineup procedure in a general way.

The test equipment required will usually be the same as that in Example 7. At the carrier terminal at either end, the test equipment connects to the voice frequency (drop) terminals. Where the carrier equipment is arranged for E & M signalling, it is sometimes necessary to apply —48 volts dc to the M lead in the direction of transmission to prevent a tone, normally "on when idle," from interfering with the measurement.

With the O.E. sending at zero DBM, the 1000 cps loss requirement is often about 3 DB, meaning that the T.M.S. at the far-end office should read —3 DBM.

If this is not the case and there is no equipment malfunction or facility fault, either a potentiometer or strapping adjustment is made the far-end carrier terminal to give the proper loss. Then the same procedure is done in the reverse direction.

Summary

Like many other things, insertion loss measurement amounts to the orderly application of simple principles—the three in Fig. 3 of Part I. Unlike some other things, however, the cheaper types of test equipment—if used at all—should be used only by experienced people who know how to cope with their shortcomings, not by the inexperienced; industry-proven equipment is recommended for those who haven't the time or inclination to study the circuit theory needed for coping with, for example, an oscillator with internal impedance varying far from 600 ohms for different level settings.

We do not pretend to understand the physicist when he talks of "anti-matter," but it would not be too far-fetched to talk of noise and other interference as "anti-transmission." At any rate these can usually be corrected for or made negligible if the proper techniques are employed.

The maintenance problem of today's telephone company is far more than merely sustaining the quality of physical plant. To meet subscriber demands for good service, transmission requirements have been stiffened considerably in the last decade and all signs point to even more stringent requirements in the future.

The company which plans on meeting the needs of its subscribers would do well to pay heed to these requirements. Periodic measurement of losses is basic to meeting them and we hope that our discussion will be of some help. So go to it!

(The End)

Frequency Setting of O.E. At Location "A"	Insertion Loss in DB (= Meter Reading in DBM at Location "B", Figure 9 (b))	Frequency Setting Of O.E. At Location "A"	Insertion Loss in DB (= Meter Reading in DBM at Location "B" Figure 9 (b))	Frequency Setting Of O.E. At Location "A"	Insertion Loss in DB (= Meter Reading in DBM at Location "B" Figure 9 (b))
50	- 4.5	280	- 9.7	400	-52
70	- 4.8	290	-10.0	405	-55
100	- 5.8	300	-10.5	410	-60
110	- 5.5	305	-11.3	415	-56
120	- 5.8	310	-12.0	420	-43
130	- 5.5	315	-11.4	425	- 32
140	- 6.0	320	-11.3	430	- 22
150	- 6.0	325	-12.0	435	- 21
160	- 6.0	330	-11.5	440	- 18
170	- 7.1	335	-12.0	445	-18
180	- 7.3	340	-13.0	450	-16
190	- 7.0	345	-12.5	455	-17
200	- 7.2	350	-13.6	460	-16
210	- 9.0	360	-16.0	465	-17
220	- 9.2	370	-16.0	470	-16.5
230	- 9.0	375	-16.0	480	-15
240	- 9.5	380	-18.3	490	-17
250	-10.0	385	-23.0	495	-17
260	- 9.5	390	-33.0		
270	-10.3	395	-42		

Table VII (Example 8). Insertion loss measurements on open-wire pair transposed to REA-1 transposition system (refer to Fig. 9).

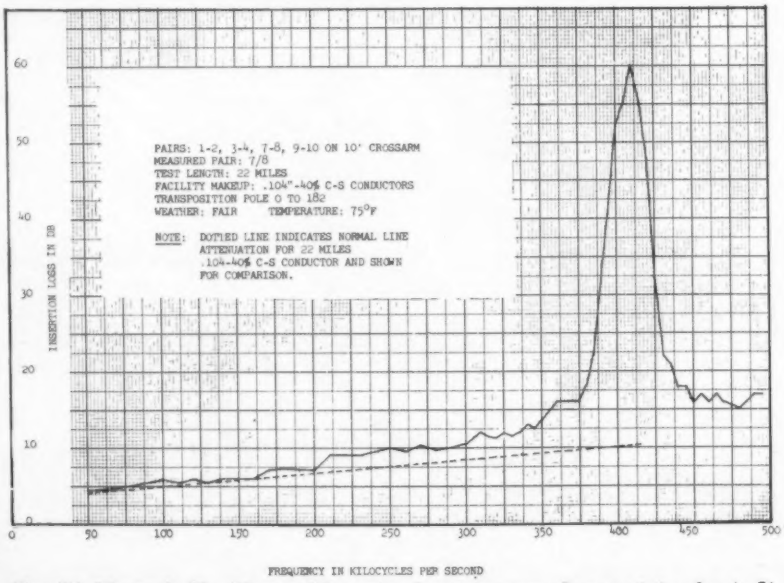


Fig. 10 (Example 8). Measured insertion loss-frequency characteristic of pair 7/8 REA-1 transposed.

THE Plant Man's Notebook

BY RAY BLAIN, TECHNICAL EDITORIAL DIRECTOR

THE FIRST unattended automatic exchange we ever saw was at Adario, O. This was back in about 1927 when we visited this exchange with representatives of the North Electric Co.

North's step-by-step switch equipment for this office had been installed in a farm house. From all indications the service was very good and a man visited the exchange at certain intervals to take care of the maintenance.

Testing was all handled from the Mansfield, O., exchange. Alarm circuits were also extended into the main exchange. Apparently, Adario did not have power service at that time.

At any rate, a Delco gas engine outfit was used for charging the storage batteries. This engine was started by remote control from Mansfield. Then the wire chief dialed a number which cut in a microphone at Adario so that he could listen in and hear the gas engine running. He then hoped it was charging. The battery voltage was also read on a meter after dialing a certain number.

This exchange gave good service for several years and then was lost in a fire when the building burned. Unattended dial switching systems are extensively used today, but they were quite a novelty back in 1927.

•

A recent survey indicates that the average cost of having a salesman visit a prospect is nearly $18. Another study illustrates that the cost of a business letter—including the writer's salary, the secretary's time, stationery, equipment, postage, and indirect costs —average about $5, with $10 for letters by top-level managers common.

In contrast, the cost of the average business long distance call (over 24 miles, with nearly six minutes of talking time) is only $1.48. It has also been determined that the average cost of a business long distance call under 24 miles for nearly five minutes conversation is only 29 cents.

It is small wonder then that toll business is on the increase. In most cases, one call can accomplish more than two or more letters and frequently does more good than a salesman's visit.

•

An exhibit of teletypewriter equipment in the form of a huge cruising van is currently touring the west coast. The "telecruiser," owned by the Teletype Corp. was built to enable the company's personnel to demonstrate the latest developments in teletype equipment on or near the customer's premises.

Sales engineers traveling the country with the van will explain the "28" line of equipment, including the new Model 28 automatic send-receive set, which many customers have expressed a desire to see. All equipment will be operating at 100 words per minute. There will also be a demonstration of "cross office" equipment operating at 200 words per minute.

•

The average speed of connection of long distance calls last year, including both DDD and operator-handled calls, was 72 seconds. This is timing from when the caller begins to dial until his party's telephone begins to ring. With DDD, the average speed of connection drops to no more than 40 seconds.

Whether the increase in DDD is playing a part or not, there's no doubt that the volume of long distance traffic is growing. In 1958, there was an average of 8.5 million long distance calls in the United States daily, compared with 5.8 million a decade earlier.

Since July 20 this year, the General Telephone Co. of California has been 100 per cent dial. This means that all of their nearly 950,000 telephones are now dial-operated. To accomplish this, their investment in plant and equipment since World War II has grown from 30 million to 350 million dollars. Since 1945, it has increased telephones more than five times and plant investment over 10 times.

•

According to *Southern Telephone News*, the distinction of being the first telephone person to use that familiar phrase "Number, please" should go to a retired Kentucky operator with the musical sounding name of Jennie Wrenn.

Retired in 1958, after 45 years of service, she still remembers when she began to say "Number, please." She tells it this way:

"After I started as an operator in Stanford in the fall of 1913, calls were answered by simply saying 'Number.' I was taught to use good manners and be polite at home.

"It seemed to me that it would be good taste and common courtesy to say 'Number, please' instead of just 'Number'."

And, in her individual fashion, she began saying "Number, please." The subscribers liked it and luckily, so did her manager.

One day she was on duty when the manager and a telephone man from Atlanta came in. They heard Miss Jennie answering "Number, please" and complimented her for her initiative in using it. Miss Jennie says that soon after this the practice was changed and all operators started saying "Number, please."

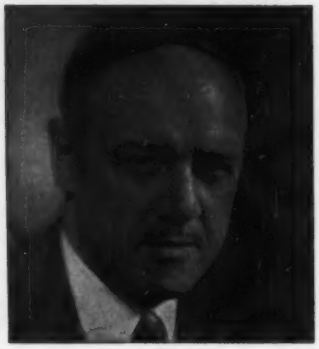
•

In discussing cable color codes and the problems that may be anticipated because of color blindness of cable splicers with a color expert, we were advised that 10 per cent of our male population and 1 per cent of all females have a color vision deficiency. This is hereditary in all cases and cannot be corrected.

today's

Highlights

of finance-taxes-business trends



by Willard F. Stanley

BONDS SLUMP TO NEW LOWS—Last month's column expressed the opinion that the early August rally in the bond market was of a temporary nature and that the trend was still, fundamentally, toward higher yields and lower prices. Unfortunately, this proved true sooner than expected, for scarcely a week had elapsed after this had been said before a decided downward plunge in all categories of debt was experienced.

This was accompanied by several unfavorable developments, tending toward higher interest rates. Notable was an increase in the rate charged on "prime" loans of commercial banks (i.e., those made to corporations having top credit); and a rise in the rediscount rate under the auspices of the Federal Reserve Banks—both to the highest levels witnessed in over 25 years. As a result, government bills, long term Federal securities and corporate obligations generally slid downward to unprecedented low price levels.

For comparison, double "A" rated utility bonds yielded a high of 5.05 per cent on new issues early in June. At the best of the August rally, an issue of this category was offered on a 4.80 per cent basis. On Sept. 21, an offering of bonds of this rating was made on a 5.63 per cent yield, a record high more than 17 per cent above the August figure.

Wall Street Journal's tabulation of 11 new utility funded debt issues at Sept. 21 indicates average yield on then current bids at about 13 decimals (0.13 per cent per annum) higher than the average yield based on original offering prices of these securities.

Offerings of public utility bonds were relatively sparse in the 30 days ended Sept. 21, there being but four new issues, aggregating 139 million dollars, of which one (for 11 million dollars) was an issue of convertible debentures. It seems likely that prevailing high yields have caused some utilities to defer their funded debt offerings. Due to two large offerings of financial corporations, industrial and railroad issues brought to market in this period totaled 225 million dollars.

The fall in the bond market can hardly be attributed to excessive offerings, but rather to all around tightening of credit, coupled with fears of further hardening of the cost of borrowing if the business boom continues at its recent pace.

For short range (the next three months or so), it is believed fears of even higher bond yields may prove well founded. Therefore, utilities having issues to offer soon are advised to proceed as promptly as possible to dispose of them, unless they can be deferred for a considerable period by bank credits, or otherwise, without straining the general corporate credit standing.

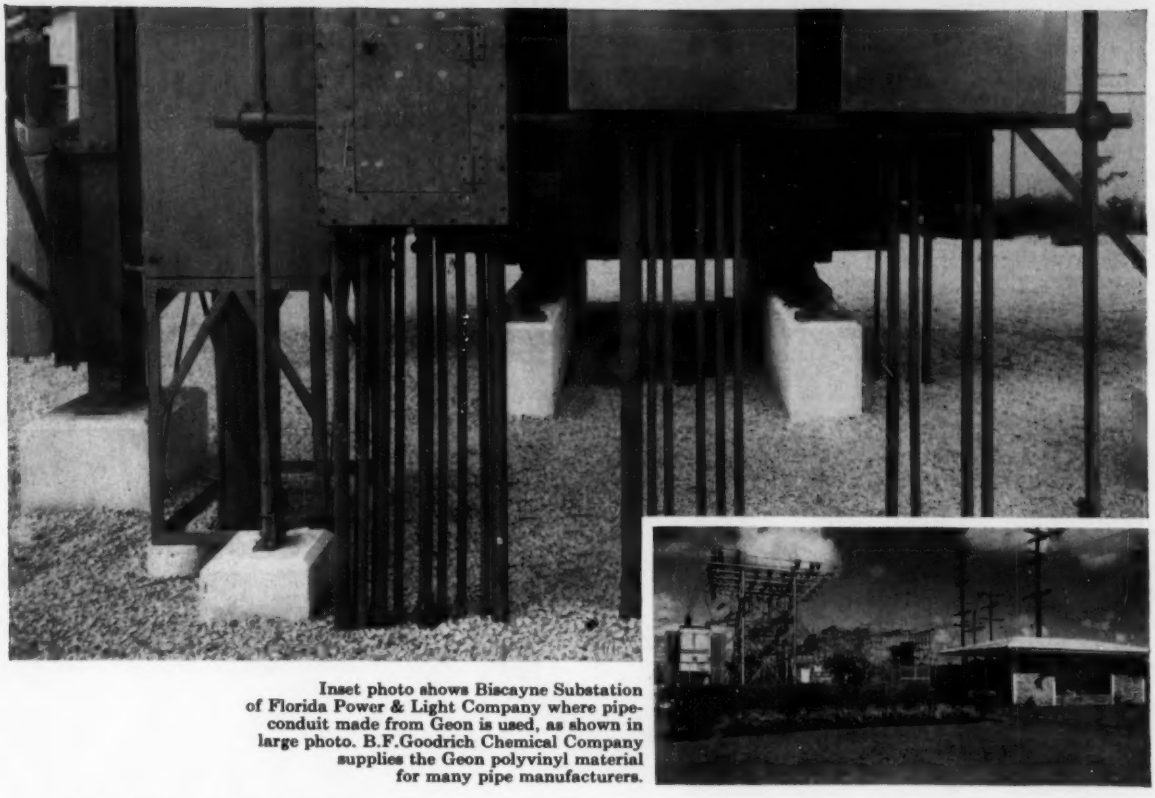
Two factors could, in our judgment, reverse the recent business boom conditions

(Please turn to page 40)

Mr. Stanley, formerly a utility financial executive, is now president of Corporate Services, Inc. of New York City and is well known as a financial writer. He is a member of the Controllers Institute of America and the New York Society of Security Analysts. He serves on the Finance Management Committee and the Tax Committee of the Controllers Institute (N. Y. Control). His articles are appearing once a month in TELEPHONY.

News about

B.F.Goodrich Chemical *raw materials*



Inset photo shows Biscayne Substation of Florida Power & Light Company where pipe-conduit made from Geon is used, as shown in large photo. B.F.Goodrich Chemical Company supplies the Geon polyvinyl material for many pipe manufacturers.

At 125 substations . . .

FP&L plans for future . . . uses conduit of Geon

Florida's rapidly expanding economy has called for fast, sure growth on the part of Florida Power & Light Company. At 125 distribution substations located throughout the state, FP&L has installed conduit made of Geon rigid vinyl—as much as 3,000 feet at some locations.

Conduit of Geon rigid vinyl is lightweight and economical to install—and promises satisfactory service far longer than ordinary conduit because it is unaffected by most causes of corrosion. Internal and external surfaces stay smooth—like new through the years.

Geon resists the corrosive effects of salt water, gases, chemicals, and acid or alkaline soils. It also resists sunlight, fungi, bacteria, moisture, heat and cold. It offers high tensile or impact strength and is not affected by galvanic corrosion.

Engineers are finding new and cost-saving uses for pipe and conduit made of Geon in many applications, both above ground and underground. For information, write Dept. AV-5, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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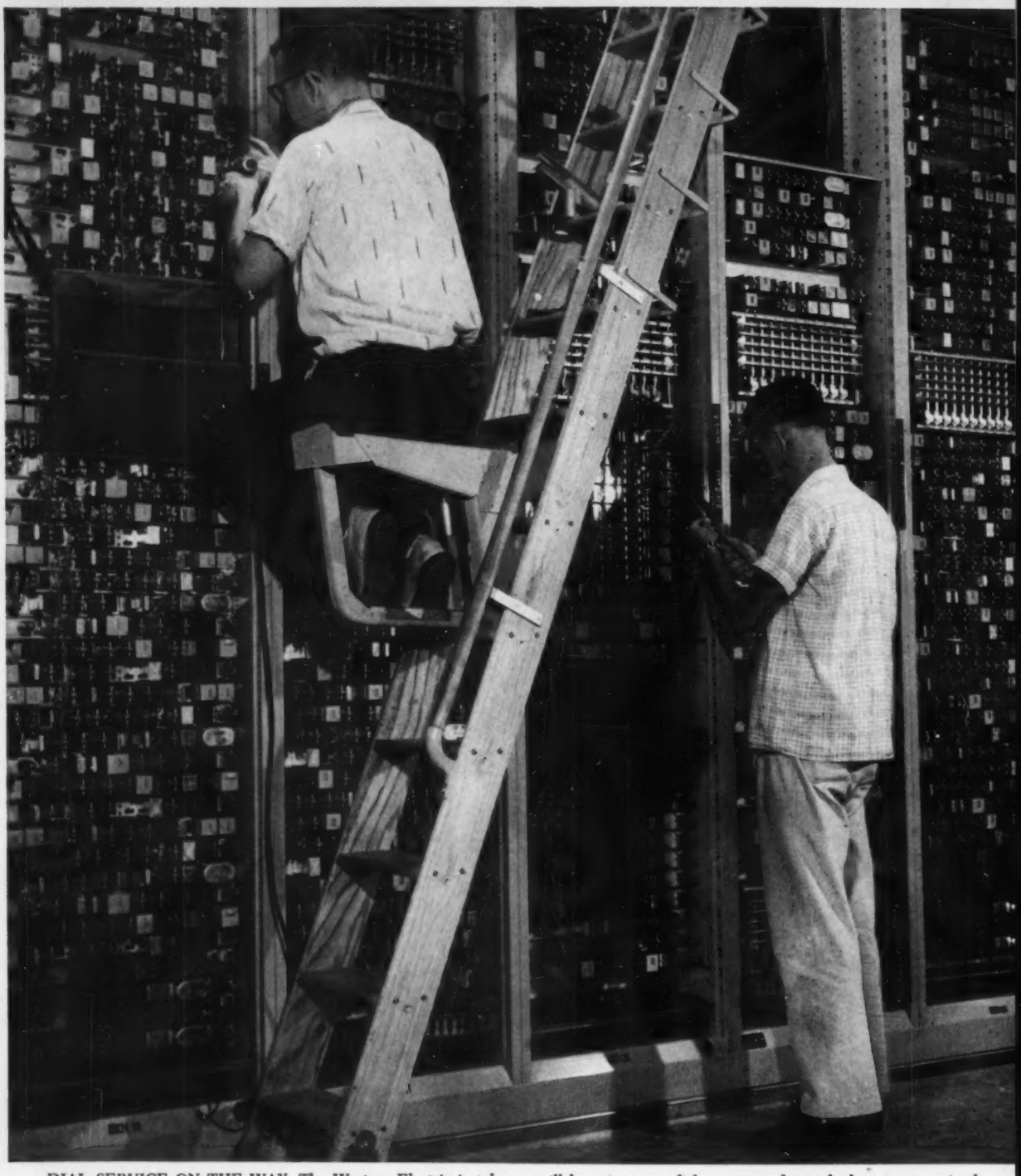


DIAL SERVICE ON THE WAY. The Western Electric installers above are wiring a bay of dial switching equipment in a new Bell telephone office in Vincennes, Ind. By mid-December, the 18,000 citizens of this historic community on the Wabash River will be using one of the most modern telephone systems in the country – dialing directly both local and long distance calls. The complex equipment was made by Western Electric and is being assembled, wired and completely tested by skilled W.E. installers.

A TALE OF 6,700 CITIES

Last year skilled Western Electric installation teams helped provide more and better Bell telephone service for 6,700 U. S. cities and towns . . . perhaps yours.

The pictures on these pages show a team of Western Electric installers helping a Bell telephone company bring dial telephone service to its customers. In this case the town is Vincennes, Indiana – but it could have been your town.

Like most Western Electric installation projects these days, the Vincennes job is a step toward dial telephone service for everyone served by the Bell System. Right now some 94% of all Bell customers have dial service. Many of them, as will the people of Vincennes, enjoy the added convenience of Direct Distance Dialing – dialing their own long distance calls quickly and accurately.

Working out of 123 key cities, our 16,000-man installation force installs the intricate Western Electric equipment which makes modern telephony possible. Their skill and craftsmanship contribute greatly to our goal of ever improving Bell telephone service.

Beside its installation activities, Western Electric Company has manufacturing plants in 25 cities where we make telephone equipment for the Bell System. Last year we purchased over a billion dollars worth of raw materials, products and services from more than 30,000 suppliers located in every state of the Union. Of these, 90% are "small businesses." The things we make and buy are distributed to the Bell telephone companies through Western Electric distribution centers in 32 different cities.

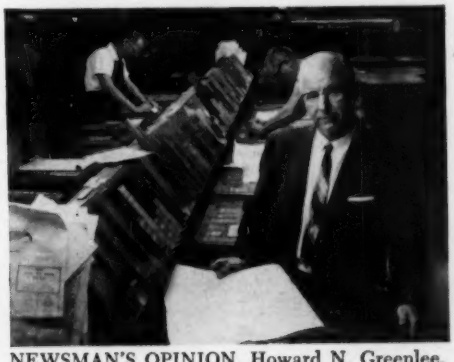
Western Electric

MANUFACTURING AND SUPPLY UNIT OF THE BELL SYSTEM

STEADY AS SHE GOES. After uncrating, the intricate frames of switching equipment are hoisted upright and placed in position. One hundred ninety such frames are being installed in Vincennes, bringing dial service to over 7,000 telephone customers.

VINCENNES LUMBER DEALER, Jack Klemeyer (right), discusses the new central office with Western Electric's job supervisor Russ Bandy. The Vincennes business community is looking forward to the completion of the new office – improved telephone service is always a help to the businessman.

"MEET THE MAYOR." During an informal sidewalk conference, Chuck Rollins (left), manager of the Indiana Bell Telephone Company office in Vincennes, introduces Mayor Lloyd ("Red") Wampler (center) to Western Electric area supervisor F. E. Oliver. Mayor Wampler says, "We are certainly glad to have a dial central office installed in Vincennes. Improved telephone service is vital to our town's prosperity."



NEWSMAN'S OPINION. Howard N. Greenlee, General Manager of the *Vincennes Sun-Commercial* and radio station WAOV has a sharp eye for his town's future. He said, "These Western Electric men are a fine crew, and they're bringing Vincennes better telephone service for a better tomorrow."

and thus act toward loosening money rates. One is a continuation of the steel strike through October or longer. The strike is already being felt in minor recessions in vital business statistics for July and August as compared with June. The other factor is a continued decline in stock market prices to a point where corporate management might be induced, temporarily at least, to defer or reduce their plans for expansion. Either or both of these factors might reverse the cost of money trend, but even if they develop, their impact would probably not be felt for several months.

Sale of common stock continues to be the one "sure thing" bet for utilities. Prices of utility equities have, so far, made good resistance to the market decline, and still offer unprecedentedly favorable price-earnings ratios and yields, from the standpoint of utility issuers.

* * * *

STOCK MARKET SLIDE—After slipping a bit in the 30 days ended Aug. 25, stock market averages declined steadily and quite substantially in the ensuing period, ended Sept. 22. At the earlier date, the New York Times combined 50-stock average had registered an increase of about 12 per cent above the 1958 year end, but by the later date, this percentage had fallen to four per cent, a decline of seven per cent. Unlike the month earlier price reductions, largely confined to highly speculative issues which had experienced phenomenal price enhancement, impact of the recent decline has been pretty much "across-the-boards." Tight money, and hardening of money rates to record levels, have been a potent factor, but, ironically enough, the recent decline appears to be due, primarily, to fear of the "rigors of peace."

It's significant that stock averages, after reaching an historic high early in August, started their long decline just about the time the invitation was extended to Khrushchev to visit the United States. As his trip has progressed, with indications of at least superficially better relations between the governments, and perhaps the peoples, of the two major powers, this fear has cumulated.

The idea is, of course, that if the "cold war" warms up, defense expenditures may be reduced, with consequent loss of profits, increased unemployment and other impacts adverse to the national economy. Naturally, the stock market, with its ridiculously high price-earnings ratios for many stocks—even in terms of recent record corporate earnings, is highly vulnerable to this or other real or fancied fears.

A "technical" rally may soon ensue, but the writer inclines to the view that the downward pressure is likely to continue until the visits, both of Khrushchev and President Eisenhower are finished. So long as these items claim the headlines, continuous impetus is given to fears of lower armament expenditures, leading to a natural desire on the part of many to take some or all of the extremely high profits which so many investors have now accumulated. So, even at today's considerably reduced prices, stocks still appear high, except for carefully selected special situations demonstrably below the market level. Utlities still remain the best selection for combined defense-offense, with minimum prospective loss plus a chance for moderate profit.

* * * *

BOOM "CARRIES ON" — Continuance of the steel strike has been powerless, thus far, to affect materially the almost uniform upward trend of employment, national income, retail sales, production etc., etc. But the monthly letter on business and economic conditions issued by the First National City Bank of New York warns that "from now on", if the strike continues, layoffs and shutdowns will spread.

We are already into this "from now on" period, since this letter was issued a while back. A more serious factor in bringing the boom to a standstill, or even reversing the upward movement of business activity, may prove to be fears of corporate management of generally lessened confidence, if the stock market continues to decline; plus possible fears of what the stock market seems to be afraid of—i.e., reduced defense spending, due to warming up of the "cold war", resulting from the exchange of visits between the leaders of the two most powerful nations.

So far, statistics on all fronts continue at or near peak levels. But, for the first time in several months, doubts are commencing to arise whether the boom will continue at its recent rapid pace or whether the factors mentioned above, or others presently unforeseen, will slow it down or bring it to a halt.

IN THE NATION'S CAPITAL

Continued from page 18

dent, the former CAB member sets forth in detail the reasons why he found his federal job so frustrating. Hector makes major recommendations to bring to the regulatory process the efficiency and judicial fairness which he feels it should have.

Hector recommends that policy making and administrative duties be transferred to an appropriate executive department, judicial and appellate functions to an administrative court, and investigative and prosecution activities to the Justice Department. "This is a matter of importance to the nation," he states. "The federal regulatory agencies wield great power over major segments of our economy and adjudicate private interests of vast size. Despite the importance of their missions, it is doubtful whether any branch of the government today functions with less effectiveness."

Hector said his experience with the CAB had convinced him that "an independent regulatory commission is not competent in these days to regulate a vital national industry in the public interest." He said he was not judging the character or ability of the men who serve on the commissions. "Not with the Founding Fathers as members of its board do I think the CAB as now organized could fulfill its obligations to the American people."

Civil aviation, Hector said, has become so necessary to economy and defense that "we must make certain it is not handicapped in the United States by a regulatory system which does not work." He described the CAB as "a creature imprisoned by its own structure and provisions. It is unable to form clear policy. It is unable to make sound and comprehensive plans. It is unable to administer its affairs with vigor and dispatch."

Hector said that as a lawyer he was "disturbed at the inability of an administrative agency, such as the CAB, to give a true judicial hearing to parties who come before it in litigated cases. . . . The policies and plans of the CAB are not coordinated with those of other agencies of our government; they are not responsive to the general policies of the President." The consequence, he concluded, is "our country has today no effective national policy on transportation."

The President is reported to be giving careful attention to Hector's criticism of the federal regulatory process. That this development cannot be dismissed as only one man's opinion is suggested by the continued investigation of the House Sub-committee on Legislative Oversight and pending legislation to amend the Federal Procedures Act, which are viewed by both the regulatory commissions and the American Bar Association with much concern. The danger to regulated interests is that Hector's sweeping proposal may be accepted too literally and drastic procedural changes seriously urged in Congress.

Note on Khrushchev's Washington Visit

'Twas the Eve of St. Nikita. And all through the House (of Representatives). Everybody was stirring—to get away from that louse. The hammer and sickle were hung by Andrews Field with care. But your correspondent thoughtfully arranged to have business in Philadelphia that day. Thus, he is unable to report to the readers of this department any blow-by-blow description of Mr. K's visit to the Nation's Capital. This writer thus avoided any snide remarks from *Pravda* (or other segments of the world's press) which might have been tempted to take dirty

(Please turn to page 44)

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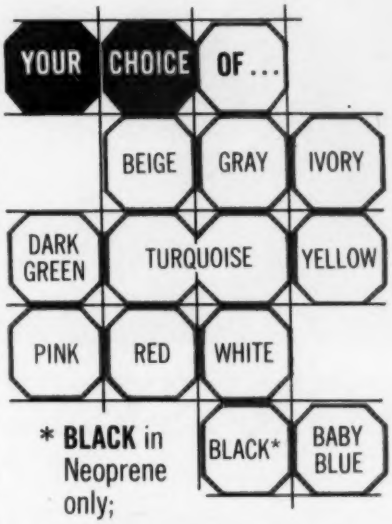

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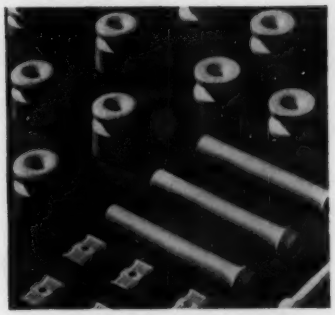
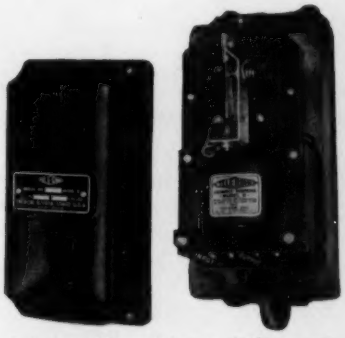
Kellogg's Standard Outside Plant Handbook now available at special price while quantities last. Reduced to $2.75 a copy, with ten or more copies priced at $2.50 each. Every phase of outside plant telephone pole line construction is covered in book.



Telephone Insulators manufactured by PORCELAIN PRODUCTS CO., Carey, Ohio. Numbers 6066, 6064, and 6065 meet exacting AT&T specifications for "C," "S," and "T" knobs, respectively. Number 4 and 4-two-groove, as well as numbers 6061 and 6062, are manufactured to the same high quality standards that have established Porcelain Products Co. as a leading supplier of telephone insulators since 1894.

Fine Telephone Poles. Dierks Pressure-Treated Southern Pine Telephone Poles, up to 110 feet. Creosote or Penta treatment. Prompt shipment out of stock. DIERKS FORESTS, INC.

The Type XB Unprotected Cable Terminal features a Bakelite faceplate and insulating fanning strip molded in one piece, with Everdur studs positioned for easy wiring. Available in 6, 11, 16, and 26 pair size, with or without cable stub.
COOK ELECTRIC COMPANY.



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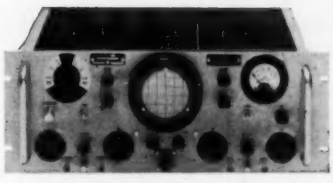

OSCILLOSCOPE especially designed for telephone work, Waterman Model S—12—CK RAKSCOPE. Signal amplifier has 50 millivolt sensitivity from DC to 1 MC. Sweeps are recurrent or triggered from ½ cycle to 50 KC. Balanced input with additional provisions for viewing either side of line to ground. Has many other features. Mounts on 19" rack, 7" high, safe 10" depth. Write for details.
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Above or below ground, remember dry conductors serve better and dry cables last longer. Service goes up and maintenance costs go down when PUREGAS goes to work guarding all along the line.

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digs at Mr. Welch's absenting himself from the festivities in Washington. No, your correspondent cheerfully gave over to Ray Blain his peach basket to stand on in front of the Pennsylvania Building.

Your editor was gratified to see, as he departed for the city of brotherly love (and juvenile switchblades) that a new coat of soot had been added to Union Station in honor of the occasion. The Capitol Building was still standing in the same place after Mr. K left, but it does seem to be all crated up, if you have looked at it recently. Oh, to be Shelley's skylark, just to have been able to decorate this historic scene with appropriate confetti!

DIRECTORY COVERS

Continued from page 21

be a hole in the cover for when the book is hung up."

•

"It is a decorative article instead of just a useful one now."

•

"Like it very much."

•

"Book looks much neater and will stay clean longer."

•

"We like it. Wish that it was received sooner. Plan to change cover design from time to time."

•

"I like the idea very much. We hang up the book and this cover keeps the corners from turning back and curling. Thank you."

•

"Very pretty and easy to use."

•

"Good protection and the inside pockets are nice to put in memorandum slips."

•

"Keeps the directory clean. Also keeps it from getting torn or bent. Very nice."

•

"The men have black grease on their hands lots of the time and that wipes off very easily. Thanks for the cover."

•

"The cover helps keep the directory clean and neat and also discourages writing on it by the family."

•

"We really appreciate the cover. It is now a decorative item, easily identified. We have had very favorable comments on the attractive and so practical cover!"

•

"Protects cover and lends a little more dignity to the book."

•

"We like it very much. It is so much cleaner and neater, we enjoyed decorating it. The plastic should have a hole in it to hang directory up."

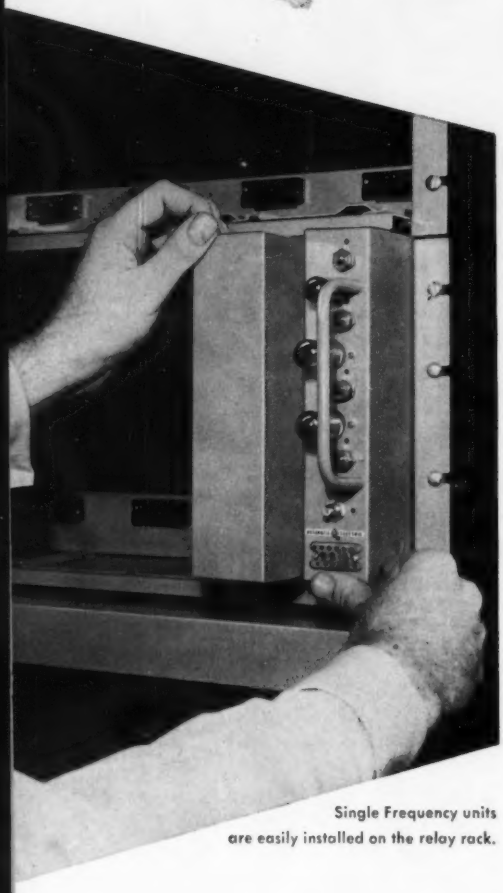
•

"Instead of decorating cover I slipped a paper with frequently called long distance numbers under cover. Quite handy."

(Please turn to page 46)

New Single-Frequency Signaling Equipment...

Provides Direct Distance Dialing on Your Existing Trunks!



Single Frequency units are easily installed on the relay rack.

What it is—Automatic Electric's new Single Frequency Signaling Equipment (ASF-1) is a device which sends dial pulses and supervisory signals over the same circuit facility used to carry conversation.

How it helps you—Single Frequency Signaling permits direct dialing between distant exchanges over existing trunks. If your company has a direct trunk to a distant city, you can dial direct, by-passing intermediate signaling relay equipment. For instance, if this trunk consists of several carrier systems in tandem, the intermediate "back-to-back" signaling equipment can be by-passed. Or, if you have trunks consisting of older type "ringdown" carrier equipment without built-in dial signaling, Single Frequency units will economically convert these trunks to dial operation. If your trunks consist of long physical plant unsuitable for DC dial signaling, you can use Single Frequency even when voice repeaters are involved. No matter what combination of facilities you are now using, Single Frequency units are employed only at the two trunk terminals.

How it works—On a DDD network, Single Frequency units are located at both ends of the direct long distance circuit. Each unit transmits a continuous low-level tone along the channel as long as it is *not* in use. Each tone is detected by a receiver at the other end of the circuit which indicates to the switching equipment that the channel is idle and available. When a toll operator or subscriber is connected to a trunk for a long-distance call, the equipment stops transmitting the tone in the outgoing direction. The absence of the tone at the receiving end causes appropriate switching equipment to be seized before dialing. As the number is dialed, the same tone is retransmitted in the form of dial pulses, but at a higher level for positive operation. The called subscriber's phone rings upon completion of dialing and switching. The signal tone going in the opposite direction is removed when the called party answers. The call has then been completed in a direct line without use of intermediate signaling equipment.

We'll be glad to give you additional information on how Single Frequency Signaling will help solve your long distance dialing problems. Write for Circular No. 1899. Address: *Automatic Electric Sales Corporation, Northlake, Illinois. Or call Fillmore 5-7111.*

DESIGNED AND MANUFACTURED BY AUTOMATIC ELECTRIC FOR THE INDEPENDENT TELEPHONE INDUSTRY

AUTOMATIC ELECTRIC GENERAL SYSTEM

Subsidiary of

GENERAL TELEPHONE & ELECTRONICS

"A *very good* idea. Should have been done before."

•

"I like the cover very much, it is practical, preserves the book, yet does not cover the name. I would like to purchase a few for gifts."

So, that is the way the affirmative answers ran all the way through. How about the negative answers? Well, there were two negative answers.

This remark from a good doctor friend who always likes to pull my leg: "The book is so small it is easily handled without tearing. Cover is not necessary. It is easy to put book in drawer. Save your money, LaMar."

And, here is the other negative reply: "Dear Mr. Stoops. Stop pulling my leg, the Better Business Bureau will hear about this, we have no plastic cover." In this instance, as in several others, the covers were intercepted because the mail was delivered to the office address instead of the residence address. In all such cases of wrong delivery, the man of the family would not release his cover to his wife, so we delivered those in person to avoid piracy.

Now, here is another remark I believe you would enjoy: "They serve a practical purpose, if not too costly." Need I tell you that card came from a banker? So much for the survey.

After giving thought to all the considerations discussed and weighing the results of the customer acceptance survey, it was only a matter of deciding, not if we should make plastic covers available, but by what method. After due consideration, we concluded that a token, or control, charge should be made in all instances (based approximately on our cost), in order to regulate distribution and prevent abuses usually present in "give away" projects. We are currently able to purchase a good grade plastic cover at 19½ cents each, F.O.B. Birmingham, Ala. We will make the covers available to our subscribers at 25 cents each—if mailed, 30 cents.

Our first offering will be made in our Argos exchange, a relatively small office with about 900 stations. We will also make the covers available in our other exchanges as new directory issues are published.

Of course, when changes such as these are made, we must take a look at our rules and regulations on file with the regulatory commission. It also calls for a look at statements appearing on our directory, which at the present time prohibit the attachment of any directory cover.

Whereas our companies' rules and regulations did specify that, "The use of any binder, holder, or auxiliary cover in connection with directories is prohibited," our rules and regulations now provide that, "The use of any binder, holder, or auxiliary cover in connection with directories is prohibited, excepting when and if approved and authorized by the telephone company."

On the front cover of our present directories the following negative statement appears, "The attachment of any special binder, cover or holder to this directory is strictly prohibited." Now that is about as, "Thou shalt not," as can be written.

On the front cover of our new directories there will appear this *positive* statement, "Approved transparent plastic covers for attachment to this directory are now available. For further

NAPPANEE TELEPHONE CO.

Survey of Plastic Cover Acceptance

Summary

Sept. 1, 1959

Covers Mailed, 152 6-19-59
Questionnaires Returned 93—61.2 per cent

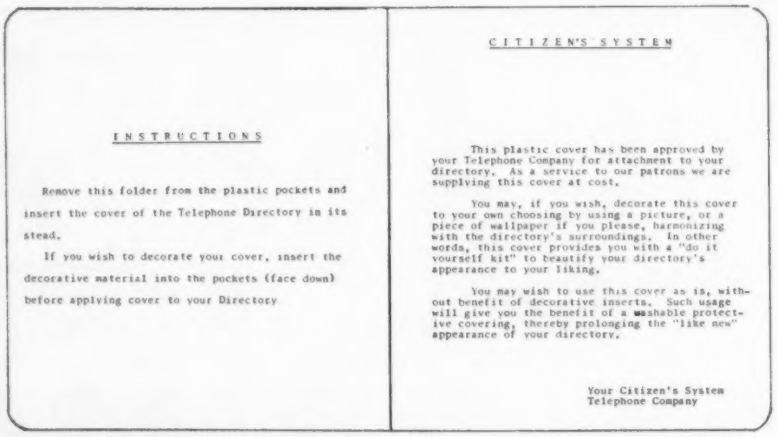
Answers to Questions

	Yes	%	No	%
Received in Good Condition	93	100.0%	0	0
Attached to Directory	91	97.8%	2	2.2%
Decorated	34	36.6%	59	63.4%
Practical	91	97.8%	2	2.2%
Signed	68	73.1%	25	26.9%

Materials Used for Decorating Plastic Covers

Magazine Cut-Outs	4	Cloth Material	2
Child Drawings	8	Wall Paper	1
Flowered Plastic	2	Gift Wrapping Paper	1
Phone List	4	Felt Design	1
"Other Side of Letter—		Oil Painting	1
Attractive"	2	Not Classified	8

Exhibit 3.



INSTRUCTIONS

Remove this folder from the plastic pockets and insert the cover of the Telephone Directory in its stead.

If you wish to decorate your cover, insert the decorative material into the pockets (face down) before applying cover to your Directory

CITIZEN'S SYSTEM

This plastic cover has been approved by your Telephone Company for attachment to your directory. As a service to our patrons we are supplying this cover at cost.

You may, if you wish, decorate this cover to your own choosing by using a picture, or a piece of wallpaper if you please, harmonizing with the directory's surroundings. In other words, this cover provides you with a "do it yourself kit" to beautify your directory's appearance to your liking.

You may wish to use this cover as is, without benefit of decorative inserts. Such usage will give you the benefit of a washable protective covering, thereby prolonging the "like new" appearance of your directory.

Your Citizen's System
Telephone Company

EXHIBIT 4. Both sides of the folder inserted in the pockets of the plastic directory covers which the Citizens Telephone Co. will offer for sale to subscribers.

New ORANGEBURG® CA* CONDUIT *with Flush Coupling Attached!*

With no separate couplings to handle or attach on the job, Orangeburg CA lays faster, costs less to install. Each long, light length has a *flush* coupling attached at one end and a standard 2° male taper at the other end, making installation a simple, one-step operation. And, since the coupling *is* attached, there are no coupling cartons to warehouse or carry to the job.

What's more, with the coupling *flush* to the conduit's outside wall, new CA is easy to stack, store and handle. The flush coupling also eliminates "staggered" joints in the trench. And that means real savings in cutting and tooling time.

Like the hundreds of millions of feet of Orangeburg fibre conduit in use since 1893, new CA has self-sealing joints and impermeable walls. Its smooth, 100% fibre raceway adds years to cable life.

New Orangeburg CA is available in 2", 3", 4", 4½" and 5" sizes. Orangeburg Standard and Nocrete Conduit, with separate sleeve couplings, are available as always. Write Dept. T-109 for Catalog 52.

ORANGEBURG MANUFACTURING CO.
Orangeburg, New York • Newark, California
A Division of The Flintkote Company, Manufacturers of America's Broadest Line of Building Products

Orangeburg Fibre Conduit is distributed by Graybar Electric Co. and General Electric Supply Co. with branches and stocks in principal cities.

No. 1958-AR

NEW KLEIN
Replaceable Gaff Adjustable Climbers

These new Klein Replaceable Gaff Climbers assure maximum quality and safety. We recommend leg irons be replaced after three sets of gaffs have been used.

The easily replaceable gaff is held in position by a self-locking screw. Full impact is absorbed by the gaff and leg iron. No load is transmitted to the screw.

Adjustable to 14½, 15, 15½, 16, 16½, 17, 17½, 18, 18½ and 19 inches. Made in matched pairs, right and left. Available with triangular ring at ankle or riveted ankle loop. Aluminum finish. Every climber individually tested.

WRITE FOR BULLETIN 559

Bulletin 559, giving full information on Klein Replaceable Gaff Adjustable Climbers, will be sent on request.

ASK YOUR SUPPLIER

Foreign Distributor: International Standard Electric Corp., New York.

Mathias KLEIN & Sons
7200 McCORMICK ROAD • CHICAGO 45, ILLINOIS

information see last yellow page."

And, in our new directories, the last yellow page will contain the information:

"Transparent plastic covers now available at cost. A recent survey discloses a great deal of interest expressed on the part of our patrons to obtain plastic covers for use on telephone directories. As a result we have tested and approved a clear plastic cover for use on Citizen's system directories, and have made them available to you at cost. Please note this offer is available only to Citizen's system patrons. These covers may be used along with inserts to decorate your directory to suit your own decor, or retain lists of frequently called points, or other bits of useful information. In other words these covers provide a "do it yourself kit." At our office, each 25 cents; if mailed, each 30 cents."

Yes, we have made a complete switch. What was that old song? "Accentuate the Positive and Eliminate the Negative?" Well, anyway, that is what we are doing this year.

Inserted in the pockets of the covers we will offer for sale, will be a folder as shown in *Exhibit 4*.

My daughter-in-law has prepared a display exhibit showing different methods of decorating covers, and how they might appear. The display is shown in *Exhibit 5*, and it will appear in our Argos office for the kick-off campaign. So there you have it. If you don't like the idea, don't tell your wife anything about it, because believe me, the ladies do like it. Again—"When you go fishing, do you pick a bait you like, or do you select a bait the fish like?"

At least we are doing *something*. We honestly believe we are going to control this "foreign" directory cover business at little or no cost to us. Time will tell.

P.S. When that banker was recently informed that we were making clear plastic covers available for 25 cents, he said: "I believe my wife would pay that for one."

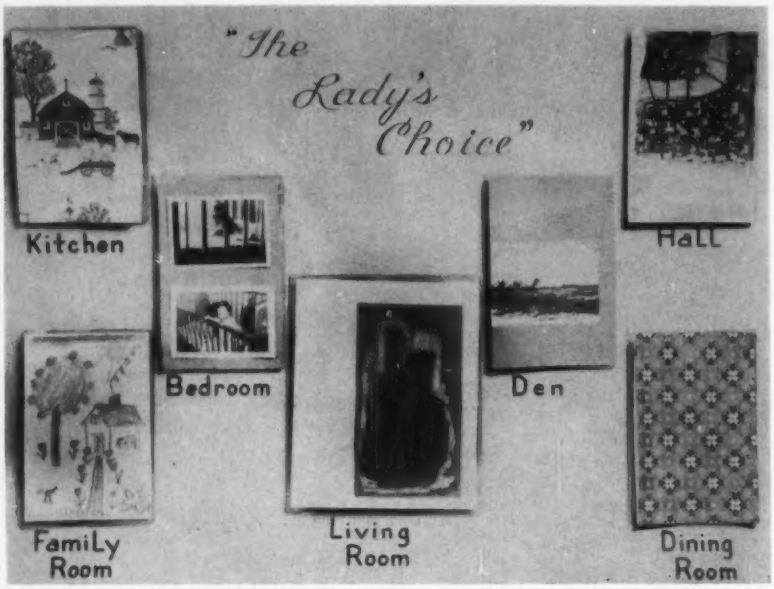


EXHIBIT 5. Suggested decorative schemes for plastic directory covers as prepared by the author's daughter-in-law.

Strength Through Struggle

"The something-for-nothing idea grows out of failure to see the purpose behind the struggle for existence. The fullest possible employment of one's faculties is what makes for strength of body, of character, of spirit, of intellect. Nonuse of faculties leads to atrophy. The story of the wild duck that joined the domestic ducks, was fed, but later couldn't fly above the barn; of the gulls that fattened up at a shrimp plant but starved when it shut down; of the cattle that became accustomed to pen feeding and died rather than forage any more; of the hand-fed squirrels that laid up no nuts for the winter but bit the hands that had fed them when they no longer held food — these and other stories of nature attest to principles of biology which are as applicable to persons who won't use reason as they are to animals which haven't the faculty of reason."—LEONARD E. READ in "Victims of Social Leveling."

SEE REX

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at the
U-S-I-T-A National Convention
Conrad Hilton Hotel, Chicago, Ill.
Room 637A

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100 HAYWARD ROAD, WEST ACTON, MASS.

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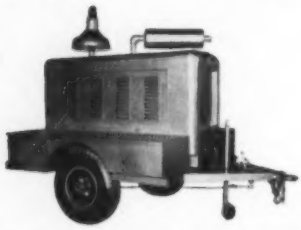
There's VERSATILITY in TELEPHONE SYSTEM SERVICE and Portability with...

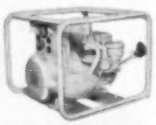
U.S

Complete "versatility" is possible for telephone system service with portable U.S. Versa-Trailer standby emergency power units in sizes from 10 kw to 35 kw capacity.



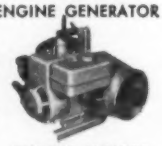
Units provide both single phase power for lights and 3-phase power for other needs. Many exchanges in an area can be served by a single unit.

Telephone systems use U.S. portable generating sets for on-the-spot power needs. Sizes 750 watts and larger, air-cooled.



ENGINE GENERATOR

Portable engine blowers provide convenient means of furnishing fresh air to manholes, or for ejecting smoke, fumes, etc.



ENGINE BLOWER

Motor driven blowers like engine driven counterparts, are invaluable for exhausting contaminated air.

MOTOR DRIVEN BLOWER

for complete information write . . .

UNITED STATES MOTORS CORPORATION
LIGHT US POWER
OSHKOSH · WISCONSIN

UNITED STATES MOTORS CORPORATION

110 W. 5th Ave. / Oshkosh, Wis.

Courts and Commissions

Approve 2 Financing Pleas; OK SAGE Facility Sale in Ore.

The Oregon Public Utility Commissioner on Sept. 21 took the following actions:

Home Telephone Co., Condon, was allowed to borrow $43,000 from the Stromberg-Carlson Co. and to secure the notes through a mortgage.

Home, which furnishes service to approximately 553 subscribers, on June 30, 1962, is to deliver a final note to Stromberg-Carlson in an amount equal to the unpaid principal balance of the interim notes.

The final note will be payable in 240 monthly payments.

Out of the proceeds from the notes, $28,000 will be used by the Home company to participate in the SAGE program for communication facilities for the 636th aircraft and warning base at Condon; $15,000 will be used for additional telephones and switchboard equipment in the Condon exchange.

The company's capital ratios as of Dec. 31, 1958, and pro forma after giving effect to the additional borrowing are as follows.

	Dec. 31, 1958	*Pro Forma*
Debt	44.7%	63.6%
Common equity	55.3	36.4
TOTAL	100.0%	100.0%

•

The Lincoln-Tillamook Telephone Co., Oceanlake, was authorized to purchase from the Pacific Telephone & Telegraph Co. certain facilities used in providing SAGE service to the Air Force at its Mt. Hebo (Ore.) air force station.

Both companies have agreed that Pacific, which has constructed or will construct and complete the installation of the necessary facilities ordered by the Air Force, should do so in order that service dates agreed upon will be met.

When these facilities are completed, Pacific will sell certain equipment to the Lincoln-Tillamook company at installed cost.

This equipment will occupy space in Pacific's building at Mt. Hebo and Pacific will provide the necessary power for and will maintain such equipment. The Lincoln-Tillamook company will pay Pacific for such space, power and maintenance based on Pacific's cost.

The reason for the equipment transfer is that both companies agree that certain services to the Air Force location at and immediately adjacent to Mt. Hebo should be furnished by Lincoln-Tillamook and to accomplish this Lincoln-Tillamook must own certain facilities.

•

The commissioner also on Sept. 21 approved the application of the Mt. Angel Telephone Co. for authority to issue $64,500 in promissory notes to be used for construction, extension, and improvement of facilities. The notes will bear 6 per cent interest.

The Mt. Angel company, which serves 461 subscribers from Mt. Angel, filed its application on Aug. 18. The application stated that subscribers would benefit by 24-hour service through the company's proposed cut-over to automatic operation.

Of the sum requested by the company in promissory notes, $7,500 at 4 per cent interest, is to be used to refund outstanding notes; and $2,446.39 is to reimburse the company's treasury. The balance is to be used for construction and improvement.

Propose Filing of Exchange Boundary Maps in Nebraska

The Nebraska Railway Commission will hold a hearing on Oct. 5 on a proposed order requiring telephone companies to file maps defining exchange boundaries and other details. This proposed order was entered under the commission's general order No. 96 dated Sept. 9, 1959, which stated that its purpose was so that "the commission may properly administer the provisions of the constitution and the Statutes of Nebraska, particularly Section 86-214 and 86-215, R. S. Supp. 1959."

The order provides that maps are to be filed within one year after the date of the order. If changes occur thereafter, revised maps must be filed by Mar. 1 of the following calendar year showing the status as of Jan. 1.

All maps must have a uniform scale of ⅝ inch per mile and shall show section lines, range, and township numbers and counties. Solid black lines shall show exchange boundaries, including areas served by service stations or

by more than one company. Service station areas will be shown by dash-dot lines and dual service by shaded areas.

The order states: "No map filed in compliance with this order shall limit, enlarge, or determine the territory in which the company may furnish the local exchange telephone service of the exchange area for which the map is filed.

"If a service station company discontinues service, the mere designation of the area served by such service station company within the exchange area of the exchange shall not necessarily place the responsibility of serving the area upon the company filing the map."

The order further states that "the acceptance or approval of a telephone service map filed pursuant to this general order shall in no way preclude the commission from thereafter entering into an investigation, either formally or informally, for the purpose of determining the accuracy of the map, or of assisting in the settlement of any boundary dispute."

A copy of each map on file with the commission must be kept on file in the business office of the company for inspection by the public. All maps must be signed by a person authorized by the company to do so.

North Carolina Company Asks Loan Approval

The North State Telephone Co., High Point, asked the North Carolina Utilities Commission on Sept. 21 for authority to borrow $500,000 from the Phoenix Mutual Life Insurance Co. of Hartford, Conn., to improve its local and long distance equipment.

The sinking fund would be for 25 years.

The company, which serves High Point, Thomasville and Randleman, said it now has 33,597 stations, double the number it had 10 years ago, and that 413 applications for service are awaiting expansion of equipment.

Robbins Tilden, general manager, said part of the money will go to convert to national toll dialing, scheduled to be completed in August 1960, and the remainder will be used for improvements in the local and toll facilities. The company has spent 5.5 million dollars in the past 10 years improving and enlarging its facilities, he said.

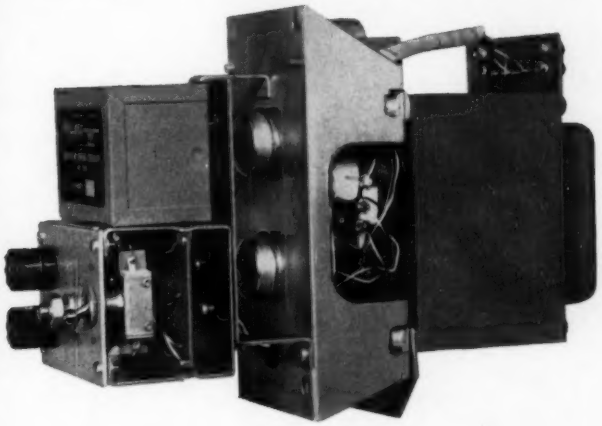
Ask Raise in R. I.-Conn.

The Westerly (R. I.) Automatic Telephone Co. has applied to the Connecticut Public Utility Commission and the Rhode Island Public Utility Administration for an additional $6,900 monthly in increased rates. The com-

KELLOGG

Transistor Ringing Generator

low cost solution for ringing problems



- **Increased Ringing Power** – up to 50 watts output per ringing frequency.
- **Operates from central office power supply** – a second TRG can be used as standby, with no need for switchover equipment if commercial power fails.
- **Maximum flexibility** – same unit can provide harmonic, decimonic and synchromonic applications.
- **Minimum maintenance** – only reliable trouble-free transistors are used.
- **Plug-in components** – no moving parts, no contacts to clean, adjust or replace.
- **Extremely stable** – takes varying room temperatures, humidities, load conditions in its stride.
- **Adjustable** – any combination of five or fewer frequencies can be provided.

Ask your Kellogg representative to give you full details on this easy way to modernize your central office.

KELLOGG Communications Division of IT&T CHICAGO, ILLINOIS

Kellogg Switchboard and Supply Company, 6650 South Cicero Avenue, Chicago 38, Ill. Communications Division of International Telephone and Telegraph Corporation.

For complete list of offices see pages 10-11

We're in room 556 at the Conrad Hilton, and are looking forward to seeing you at the U.S. I.T.A. Convention October 11-14

CABLE SPINNING EQUIPMENT CO.

Topeka, Kansas

Spiraflex® CORD

BY GENERAL INSULATED WIRE WORKS, INC.*

*Licensed to manufacture under existing patents.

Telephone cord sets of proved performance backed by General Insulated's unmatched experience and know-how in the manufacture of quality telephone tinsel cordage:

Spiraflex HANDSET CORDS in bright colors with non-staining thermoplastic jackets in solid color extrusions matching color shade and sheen of telephone sets. Also non-staining black Neoprene jacketed cords. Both types available with or without integral moldings and terminations. Furnished in standard or extra long lengths.

STRAIGHT HANDSET AND DESK SET CORDS are available in non-staining thermoplastic constructions in matching colors and in black Neoprene.

GENERAL INSULATED WIRE WORKS, INC.

A DIVISION OF GENERAL CABLE CORPORATION
Providence 5, Rhode Island

pany serves over 7,800 stations in Rhode Island and approximately 2,500 in Connecticut. It is also seeking pay-station increases.

General Files Rate Ruling Appeal in Illinois Court

The General Telephone Co. of Illinois on Sept. 9 filed an appeal of an Illinois Commerce Commission rate ruling with the McLean County Circuit Court. The appeal came the day after the commission had denied the company's request for a rehearing on the 3.2-million-dollar rate raise granted on July 30 (TELEPHONY, Sept. 19).

The company had requested increased rates amounting to 3.6 million dollars.

On Aug. 28, the company filed a petition for a rehearing before the commission seeking the additional $400,000.

The General company, in asking for the rehearing, had said that the commission did not give "sufficient weight" to the cost of reproduction of the company's property in determining its fair value.

Set Hearing in New York On Company's Service

The New York Public Service Commission announced on Sept. 25 that it had instituted an investigation to determine whether the services and facilities of Cato & Meridian Telephone Co., Cato, are adequate. A public hearing will be held at 10:30 a.m., Oct. 21, at Cayuga County Court House in Auburn before Examiner F. Leonard Titus.

The company provides telephone service to about 2,800 stations in northern Cayuga County. Its service has been a matter of frequent complaints in recent months as a result of which PSC staff members have been working with the company in an effort to correct existing difficulties.

SW States Granted Interim Increase in Texas

An interim rate increase, effective Nov. 1 in Leonard, Tex., was granted to the Southwestern States Telephone Co., Brownwood, it was reported on Sept. 22.

When the company completes its cut over to dial service—expected by the third quarter of 1960—higher rates will go into effect.

Propose Stock Split

A meeting to consider increasing its 1,250,000 shares of $10 par value common stock to 2 million shares will be held for stockholders of Central Telephone Co. on Oct. 23. The directors have recommended that the increased number of shares be split on the basis

of 13 shares for each 10 held as of Nov. 20. Central Electric & Gas Co. owns 56.5 per cent of the common stock of Central Telephone Co.

Obituary

FREDERICK M. STRASSER, 67, of Lincoln, Neb., retired supervisor of supplies of the Lincoln Telephone & Telegraph Co., died on Sept. 20 in a Lincoln hospital. He had been ill for several months.

Born at El Dorado, Kan., Mr. Strasser began his telephone career at York, Neb. in 1911 when he became a combinationman with the former York County Independent Telephone Co.

In 1912, the Lincoln Telephone & Telegraph Co. purchased the York company properties and Mr. Strasser became a combinationman with the LT&T Company.

He moved to David City as wire chief in 1913 and became manager there in 1916. In 1918, during World War I, he joined the army, serving until 1919 when he returned to become manager of the University Place exchange at Lincoln. He became cost engineer in 1923, supervisor of supplies in 1929, and retired on Nov. 1, 1956. He then served as acting secretary-treasurer of the Nebraska Telephone Association until June 1, 1957.

He was a past president and charter member of the Frank H. Woods chapter of the Independent Telephone Pioneer Association, and a member of the Nebraska Engineering Society.

Mr. Strasser is survived by his wife, Hazel; two sons, Dale of Akron, O., and Richard of Toronto, Can.; and by one sister, one brother and eight grandchildren.

Incorporate in South Dakota

Articles of incorporation have been filed with the South Dakota Secretary of State by the Northeast Little White River Telephone Co. Directors are Lester Stromer, C. W. Gregg, Larry Hutchinson, William Krogman and C. H. Hight, all of White River.

OK Sale in Minnesota

The Minnesota Railroad & Warehouse Commission on Sept. 24 authorized the Farmers & Village Switchboard Co., Holt, to sell its property to the Wikstrom Telephone Co., Inc., Karlstadt. The Farmers company serves approximately 76 stations.

Two Ask Raises in Wis.

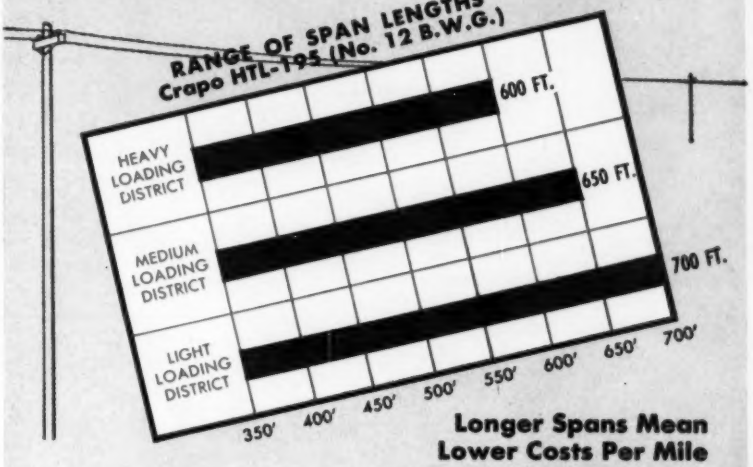
The Wisconsin Public Service Commission on Sept. 30 was to have heard the rate increase applications of two companies, the Sullivan Telephone Co., and the Dairyland Telephone Corp.

Crapo

HTL-195

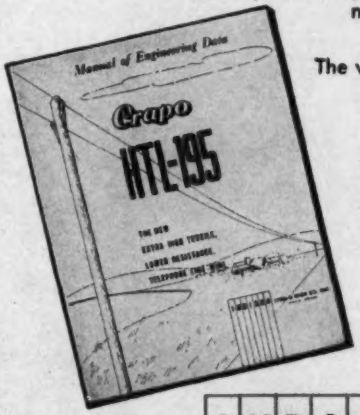
FOR EXTRA LONG SPAN RURAL LINES

The *NEW LOWER* Resistance Extra-High Tensile Line Wire



Longer Spans Mean Lower Costs Per Mile

You can cut the number of pole structures to a minimum when you use Crapo HTL-195 in building rural telephone lines. Extra long span construction, made possible by the high physical strength of this new wire, means marked savings in material and installation costs.



The voice transmission quality of Crapo HTL-195 is equal to that of Crapo HTL-135 and superior to older grades of ferrous wire.

Pertinent technical data have been prepared to assist engineers in designing and building extra long span lines with Crapo HTL-195.

WRITE TODAY for FREE COPY of the CRAPO HTL-195 "Manual of Engineering Data" No. A-195

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MUNCIE, INDIANA

Thornhill Publishing Company

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PERFECT GIFT & AWARD ITEM

Tel-O-Pen desk set is beautifully molded in colors and materials to accurately match today's telephones. Precision made, high quality ball point pen to match. Receivers can be imprinted with name or initials. Each set individually boxed. Special price to telephone company employees $1.50 each. Sets are weighted to double in service as paper weights. A truly distinctive, handsome and practical accessory.

Write today for colors and other details.
DEPT. M

MASTERCRAFT PEN CO.
514 Lighthouse Avenue
Monterey, California

Communications Session To Be Part of AIEE Meet

Telecommunications will be the subject of papers presented at the Wednesday, Oct. 14 session of the fall general meeting of the American Institute of Electrical Engineers.

The Oct. 12-16 meeting will be held in the Morrison Hotel, Chicago.

The morning session on Oct. 14 will hear two papers on the theoretical aspects of the design of switching circuits for electronic switching systems, a report on the design of a restricter for direct distance dialing, and a final paper describing a new small crossbar PBX.

In the afternoon, reports devoted to the problems of reconstructing water-damaged telephone exchanges, the design of mobile (van-mounted) telephone switching equipment and a review of the latest developments abroad in the design of electronic PBX equipment and PBX's using push-button selection, will be presented.

The Oct. 14 sessions are under the direction of the AIEE Communication Switching Systems Committee.

G. N. Thayer Named AT&T's Vice President, Marketing

The election of Gordon N. Thayer as vice president, marketing, was announced on Sept. 22 by American Telephone & Telegraph Co. Mr. Thayer will replace James W. Cook, who has been appointed public relations vice president for the company.

Mr. Thayer has been operating vice president of the Ohio Bell Telephone Co. for the last two years, with headquarters at Cleveland.

Previously he had served as chief engineer of AT&T, and as a vice president of Bell Telephone Laboratories, where he began his career in 1930.

A native of Delta, Colo., he is a graduate of Stevens Institute of Technology. He is a fellow of the Institute of Radio Engineers, and a member of the Army's Scientific Advisory Panel and of the AIEE.

Credit Card Company Lists Affiliates in Yellow Pages

The American Express Co., according to the New York *Herald Tribune*, is the first credit card company to register all the establishments honoring its card in the Manhattan classified telephone directory.

The section, under the heading "Credit and Charge Plans" will cover about three pages in the 1960 book and will give the name, address, and telephone numbers of about 8,000 outlets.

The New York Telephone Co.'s Manhattan classified telephone directory has had separate listings of companies which sponsor credit plans but has never listed the stores or restaurants at which they could be used under a "credit" heading.

In addition, the identifying line "American Express credit cards honored" will appear beneath the present entry of each of these service establishments.

Klang to Direct General's Product Development

Donald E. Klang has been appointed director of product development at General Telephone & Electronics Corp., R. Parker Sullivan, vice president—marketing & sales, announced on Sept. 16.

D. E. KLANG

Mr. Klang transferred to the company's New York City headquarters from General Telephone Laboratories, Northlake, Ill., where he was secretary of the technical policy committee. In his new position, Mr. Klang will guide the various customer premise communication products and services from the idea stage through their complete development, including the introduction of the product to the market. He will report to Mr. Sullivan.

A native of Wausau, Wis., Mr. Klang received his B.S. and M.S. degrees in electrical engineering from the University of Wisconsin.

After attending radar school at Massachusetts Institute of Technology in World War II, he served as a Navy electronics officer.

He started with General Telephone Laboratories in 1949, and was transferred a year later to the engineering department of Automatic Electric Co., a manufacturing subsidiary of General Telephone & Electronics. He then be-

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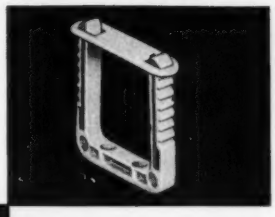

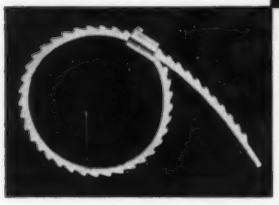

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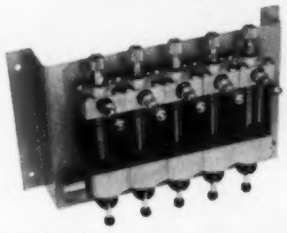

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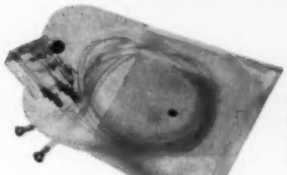

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came planning engineer, the position he held prior to his new assignment.

He is a member of the American Institute of Electrical Engineers.

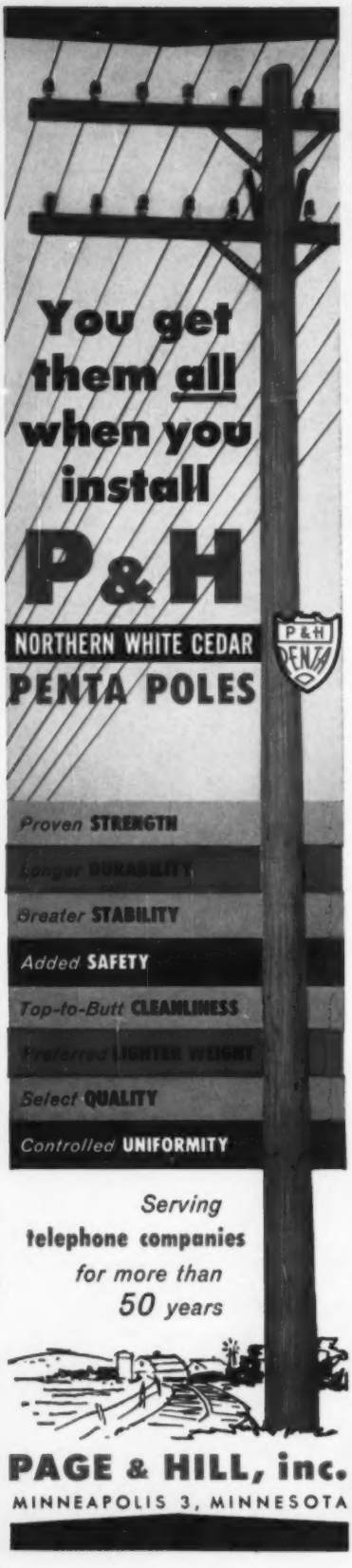
Hamburger and Ridley Move Up in Posts at Copperweld

F. E. Leib, vice president in charge of the Wire and Cable Division of Copperweld Steel Co., announced on Sept. 15 the promotions of George Hamburger to sales manager and R. C. Ridley to the position of assistant to the vice president. Both men will be located at this division's headquarters in Glassport, Pa.

GEORGE HAMBURGER

Mr. Hamburger formerly was located in Washington, D. C. where he was manager of communication and government sales for the Wire and Cable Division. Prior to that, he was manager of the St. Louis district.

A native of Denver, Colo., Mr. Ham-



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R. C. RIDLEY

burger received his technical education in the School of Engineering, University of Colorado. He has been actively engaged in the electrical field since 1934.

Mr. Ridley has been associated with Copperweld since 1935 and moves to his new post from assistant manager of sales at the Glassport plant.

Born in New York City, Mr. Ridley holds a B.S. degree in business administration from Columbia University and a law degree from St. Lawrence University.

He served with the Navy Department in the Bureau of Supplies and Accounts in Washington during World War II.

Sundell Heads Stromberg Marketing Research

The appointment of Stephen D. Sundell as manager of marketing research in Stromberg-Carlson's Research & Advanced Development Division was announced on Sept. 21 by Dr. Royal Weller, vice president-engineering.

In this new position, Mr. Sundell will perform marketing research and analysis for the research & advanced development division, and will be available to assist the operating divisions upon request, Dr. Weller said. Stromberg-Carlson is a division of General Dynamics Corp.

Mr. Sundell joined Stromberg-Carlson from Schenectady, N. Y., where he was a specialist in marketing research and administration for the General Electric Co. Earlier, he was with the Burlington Industries Corp. in a sales capacity.

S. D. SUNDELL

A native of New York City, he is a graduate of New York University and of the N.Y.U. College of Law. He was admitted to the New York State Bar in 1955, and is a member of the American Bar Association and the American Marketing Association.

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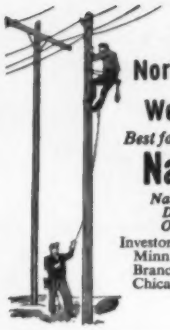

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369		

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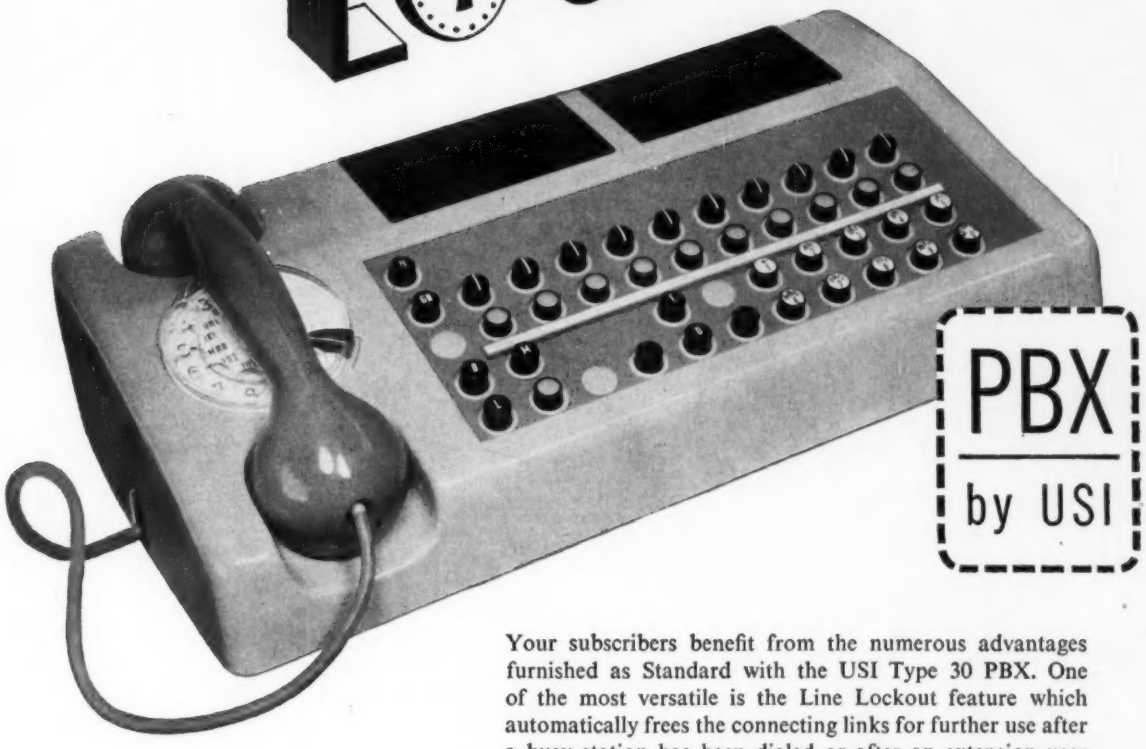

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